

CLOSED
WEST YELLOWSTONE HEBGEN BASIN
SOLID WASTE DISTRICT
LICENSE NUMBER 237

DAMSCHEN & ASSOCIATES

JUNE 1996 SAMPLING RESULTS

SEPTEMBER 1996

IS LOCATED IN THE GROUNDWATER
MONITORING REPORTS ARCHIVE,
BOX NUMBER 2

RECEIVED 9/4/1996



CLOSED
WEST YELLOWSTONE HEBGEN BASIN
SOLID WASTE DISTRICT
LICENSE NUMBER 237

DAMSCHEN & ASSOCIATES

OCTOBER 1995 WATER SAMPLING RESULTS

DECEMBER 1995

IS LOCATED IN THE GROUNDWATER
MONITORING REPORTS ARCHIVE,
BOX NUMBER 2

RECEIVED 12/8/1995

9 Monitoring
Wells Installed

WEST YELLOWSTONE -- CLASS II LANDFILL
SAMPLING SCHEDULE

8/30/76

WY R.S. Well	9/8/77	9/9/77	8/1/78	10/4/78	1979	6/25/80	7/20/81	1982	1983	1984	1985	1986	1987	1988	10/4/89	10/24/90	1991	9/26/92	1993
Cd	As	As	Fe	Fe		TDS	Fe	Fe			Cl				CaCO ₃	CaCO ₃		CaCO ₃	
Cr	Ca	Cd	Pb(d)	Pb(d)			Pb				Fe				Cl	Cl		Cl	
Fe	Cd	Cl	TDS	TDS			TDS				Pb				Fe	COD		COD	
Hg	Cl	Co ₂	Zn(d)	Zn(d)							pH				Hg	Fe		Fe(d)	
Mn	COD	Cr									So ₄				Mn	Mn		Mn(d)	
Pb	Co ₂	Hg									TDS				Pb	pH		So ₄	
pH	Cu ₂	No ₃									Zn				pH	So ₄		TDS	
	Fe	Pb ₃													So ₄	TDS		Zn	
	Hg	pH													TDS	Zn			
	Cd	Mg																	
	Co ₂	Mn																	
	Cr ₂	Na																	
	Fe	No ₃																	
	Pb	Pb ₃																	
	pH	pH																	
	Hg	So ₄																	
	Mn	Sc																	
	TDS	So ₄																	
		TDS																	

NW Pilot MW &

SW Pilot MW

2,4-D

As

BOD

Ca

Cd

Cl

COD

Co₂

Cr

Cu

Fe

Hg

Mg

Mn

Na

pH

Pb

So₄

So₄

TDS

"Target Levels"

pH = 6.5-8.5

Sc = 100

TDS = 150 mg/l

CaCO₃ = 50 mg/l

CL = 10 mg/l

So₄ = 5 mg/l

8/27/98

CLOSED
WEST YELLOWSTONE HEBGEN BASIN
SOLID WASTE DISTRICT
LICENSE NUMBER 237

DAMSCHEN & ASSOCIATES

SEPTEMBER 1992 GROUNDWATER
MONITORING RESULTS

OCTOBER 1992

IS LOCATED IN THE GROUNDWATER
MONITORING REPORTS ARCHIVE,
BOX NUMBER 2

RECEIVED 10/30/1992

CLOSED
WEST YELLOWSTONE HEBGEN BASIN
SOLID WASTE DISTRICT
LICENSE NUMBER 237

DAMSCHEN & ASSOCIATES

REPORT OF 1990 SAMPLING, GROUND
WATER MONITORING

JANUARY 1991

IS LOCATED IN THE GROUNDWATER
MONITORING REPORTS ARCHIVE,
BOX NUMBER 2

RECEIVED 6/21/1991



DAMSCHE & ASSOCIATES, INC.

CONSULTING ENGINEERS

2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604

TELEPHONE (406) 449-8627

December 20, 1989

RECEIVED

JUN 21 1991

MONTANA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SCIENCES
SOLID & HAZARDOUS WASTE BUREAU

West Yellowstone/Hebgen Basin
Solid Waste District
P.O. Box 239
West Yellowstone, MT 59758

Subject: Progress Report and Test Results
West Yellowstone Landfill
Ground Water Monitoring Program

Dear Board Members:

This letter report presents the results of our ground water sampling and testing at the West Yellowstone landfill. This work represents a portion of the work recommended in our letter to Jim Leiter dated September 6, 1989.

I. INTRODUCTION

In our September 6 letter, we outlined a plan of work to be conducted at the closed West Yellowstone landfill. This work included: 1) records research for information on the existing monitoring wells at the site and producing water wells in the area; 2) drilling a deeper test boring and completing it as a monitoring well and conducting aquifer tests on the well; 3) collecting water samples from the new well at various depths and testing for a more extensive list of constituents than previously addressed; and 4) sampling of the existing wells and testing for constituents evaluated during previous testing programs.

To date, only the sampling and laboratory testing of the existing wells and a portion of the records research has been completed. This letter report presents the results of the sampling of the existing wells that was recently conducted.

II. BACKGROUND

The West Yellowstone landfill was first opened in 1971. Active Class II landfilling was stopped in 1982 after transfer station was built on the site. The landfill continued to accept Class III waste until 1988. The landfill was closed in 1988 and final contouring was completed in October, 1989 according to the landfill closure plan designed by Damschen & Associates, Inc.

Two previous reports on the ground water conditions at the site have been issued by Harry Kringler of the Gallatin National Forest. The following discussion was summarized from these reports.

In 1976, two monitoring wells were installed at the site in order to meet new landfill operation regulations. Testing of samples from these wells indicated concentrations of iron, manganese, lead, mercury and cadmium exceeding drinking water standards. Chlorinated pesticides and herbicides were below the detection limits in these wells except one well which showed a trace of 2,4-D. These wells are known as the northwest pilot well and southwest pilot well. These wells were completed with 1½-inch glued PVC pipe which is too small to sample using a standard bailer.

In 1977, nine monitoring wells were installed around the site to evaluate the areal extent of contamination. See Figures 1-11 for locations of the wells. These wells were completed using four-inch glued PVC pipe. As we understand it, the pipe was perforated with small holes which restricted the flow of water. 3 or 4 wells had saw-cut slots added for better flow. The wells were completed only 1 to 3 feet into the groundwater.

These wells were sampled in 1977 and laboratory test results indicate that most constituents showed an increase in concentration in and downgradient from the landfill as compared to an up-gradient background well drilled just inside Yellowstone Park. A seep along the Madison River was also sampled and tested. Two samples were tested for chlorinated pesticides and herbicides with none being detected.

In 1978, a program of sampling the wells on a periodic basis was performed from May through December. Wells nearest the landfill (A and C) showed higher concentrations of total dissolved solids (TDS) (a general indicator of contamination) between May and September. Wells slightly further from the landfill (B and D) showed higher concentrations of TDS between October and December. TDS in the background well (E) peaked in June and July and again in October and November. The testing indicated a drastic reduction in iron concentration, which indicates that the high iron concentrations reported in 1977 were probably erroneous.

In both reports a gradient of ground water flow, based on water elevations within the wells, showed a southwest direction toward the Madison River. However, the highest concentrations of constituents were reported to be within or west of the landfill. Both reports recommended more monitoring wells west of the site.

Testing was conducted on the wells again in 1980, 1981, and 1985. These results indicated comparable or a reduction in concentrations for most constituents. However, an increase in TDS was noted at most of the wells in 1985.

Results of selected previous test results are presented on Tables 1-A through 1-J.

A summary of the test result through 1985 was performed by Harry Kringler of Gallatin National Forest. In this summary, target values for discontinuing monitoring for nine properties and con-

values for discontinuing monitoring for nine properties and constituents were recommended. These values are included on the referenced tables.

III. FIELD AND LABORATORY WORK

A. Field Work

Water samples were taken from the nine monitoring wells A through H and point J on October 4 and 5, 1989. Samples were not obtained from the pilot wells because the casing in the wells is too small for a standard sampler. Prior to sampling, the depth to water was measured and approximately one casing volume of water was purged from each well. After sampling, additional water was withdrawn for field testing of temperature, pH, and specific conductivity. Between wells, all exposed equipment was either discarded or decontaminated using a wash of trisodium phosphate followed by a rinse of tap water and a double rinse of deionized water.

The samples were packed in ice and shipped to Energy Laboratories in Billings for analysis. Each sample was laboratory tested for pH, TDS, alkalinity, chloride, sulfate, iron, lead, manganese, mercury, and zinc. Chemical oxygen demand (COD) was not tested for because sample preparation changes the pH and sulfate concentrations of the water and additional sample bottles were not available. Retesting of one sample and spiking of another provided adequate laboratory quality control.

B. Test Results

The test results from the samples collected in October, 1989 are presented on Tables 1-A through 1-J. The laboratory reports are attached as Appendix A.

In general, most constituent concentrations were near or below previous levels. Specific conductivity and sulfate levels were higher in all samples except the background well. Contour maps of pH, SC, TDS, alkalinity, chloride, sulfate, iron, manganese, zinc and lead and mercury are presented on Figures 1 through 10.

pH values were slightly lower nearest the landfill and higher near the river than 1985 levels. The lowest levels recorded were within the landfill.

Specific conductivity levels were above the target value set by Gallatin National Forest in all samples except the background well. The target is 100 $\mu\text{mhos/cm}$ while the background level is 90 $\mu\text{mhos/cm}$. This target value may be too low to be attainable at this site.

TDS concentrations were above the target value in only the three closest wells to the landfill (wells A, C, and D). TDS values were near or below previous levels.

Alkalinity levels were above target values in most wells except the background, but the concentrations were lower than in 1977.

Chloride concentrations were above the target values in only the closest well outside the landfill (C) and all values were below the 1985 and 1977 levels except at point J which showed a slight increase.

Sulfate concentrations showed an increase since 1985 and three wells near the landfill (A, C, and D) and well I and point J near the river were above the target values.

Iron concentrations in all samples were down from previous dates and all were well below the target values. Well G showed the highest concentration which may be anomalous and could be caused by the decomposition of a rodent found inside the well casing.

Manganese concentrations were well above drinking water standards in six wells nearest the landfill (A, B, C, D, F, and H) but were well below in the other samples. The concentrations were down from 1977 levels.

Zinc concentrations were above target values in three wells near the landfill (A, C, and D). Some levels increased and others decreased from previous values. A high value of 8.9 mg/l in well A for 1985 may have been anomalous as the concentration is now 0.17 mg/l.

Lead and mercury concentrations were below the detection limit in all samples which is well below the target value.

Standing water levels in the wells were close to 1977 values with most slightly higher. Using well elevations supplied by the Gallatin National Forest, we plotted a ground water contour map for October, 1989 which is presented on Figure 11. These contours indicate a gradient toward the southwest near the landfill. The gradient is steeper west of well H but the direction of flow in this area cannot be determined from the data available. The method of measurement of depth to water left a margin of error up to 1/2 foot, therefore, this information is tentative. The well elevations used indicated that the ground surface slopes to the northwest around the site. This generally agrees with published U.S.G.S. topographic mapping of the area.

IV. DISCUSSION

In general, the data gathered and presented herein indicate that measured concentrations for most constituents evaluated have decreased since monitoring began in 1977 at the nine monitoring wells at the site. The exception is a higher concentration of sulfate. Most properties or constituents are above target levels in at least some wells, however, concentrations of iron, lead, and mercury were well below target levels in all samples. All samples were above target values in at least one area except for the background well.

The most conspicuous values were concentrations of manganese. The values were below the limit of detection at the background well and two orders of magnitude above drinking water standards in wells around the landfill.

The highest concentrations of the most constituents occurs at well C. Well B is close to the landfill, but the concentrations are much lower than at well C. Well A is also high, but is not the highest as it was in 1977. If the contaminants were moving southwest from the landfill cells as indicated in the Forest Service reports, the concentrations would be similar between wells B and C. Three explanations are offered here for this discrepancy: 1) most of the leachate which is reaching the ground water is coming from the north side of the landfill; 2) the ground water is not moving southwest, but west to west-southwest from the landfill or 3) the leachate sinks within the aquifer and is below well B.

The second explanation is not supported by the ground water contour map on Figure 11 which shows a southwestern gradient. Further exploration including monitoring well(s) and sample testing further west of the site would be necessary to evaluate this discrepancy. At least one well is recommended for a later date and is within the scope of this investigation. Also, resurveying of the wells and measuring the depths to water more accurately would also be beneficial in this evaluation.

We would expect to see the contaminant concentrations in well A decrease over time now that the landfill is properly closed. This may already be showing up since the landfill has not been accepting Class II waste since 1982.

Concentrations of the metals tested approach the background value near the Madison River. It is apparent that the metals evaluated have not yet reached the river at Point J. The other constituents and properties show an increase at point J which may indicate that other constituents, including those not yet evaluated, may have moved this distance from the landfill. At the current level of information, we cannot make this determination. It is also possible that contaminants may be deeper within the aquifer than we are able to currently test.

V. RECOMMENDATIONS

Laboratory test results indicate that concentrations of iron were well below target values while lead and mercury were below the limits of detection in all samples. We recommend that these metals should be dropped from the monitoring program in the existing wells.

The most conspicuous values were concentrations of manganese. The values were below the limit of detection at the background well and two orders of magnitude above drinking water standards in wells around the landfill.

The highest concentrations of the most conspicuous elements occur at Well C. Well B is closer to the landfill, but the concentrations are much lower than at Well C. Well A is also high, but is not the highest as it was in 1977. If the concentrations were moving southeast from the landfill, the concentrations would be higher between Wells B and C. These explanations are offered here for this discrepancy. (1) Most of the leachate which is reaching the ground water is coming from the north side of the landfill; (2) the ground water is not moving southeast, but west or northwest from the landfill; or (3) the leachate leaks within the aquifer and is below Well B.

The second explanation is not supported by the ground water concentrations as shown in Figure 1 which shows a southeastern gradient. Further west of the site would be necessary to evaluate this discrepancy. At least one well is recommended for a later date and within the scope of this investigation. Also, monitoring of the wells and monitoring the degree to which water would be beneficial in this evaluation.

We would expect to see the concentrations in Well A decrease over time now that the landfill is properly closed. This may already be showing up since the landfill has not been operating since it was closed in 1977.

Concentrations of the metals tested approach the background values near the Madison River. It is apparent that the metals evaluated have not yet reached the river at Point 1. The other concentrations and properties show an increase at Point 2 which may indicate that other constituents, including those not yet evaluated, may have moved this distance from the landfill. At the current level of information, we cannot make this determination. It is also possible that concentrations may be higher within the aquifer than we are able to currently detect.

4. RECOMMENDATIONS

Laboratory tests reveal leachate that concentrations of iron were well below current values while lead and mercury were below the limit of detection in all samples. We recommend that these metals should be dropped from the monitoring program in the existing wells.

The sampling program presented herein should be repeated again next fall if a new ground water monitoring program has not been established.

As part of the work plan identified in our September 6, 1989 letter, we still recommend drilling of another monitoring well at the site. Based on the information presented here, this well should be installed west of the landfill. This concurs with recommendations of the Gallatin National Forest.

Testing of the new well should include a broad suite of constituents, especially organic compounds. Previous testing of organic compounds at the site was limited to chlorinated pesticides and herbicides and none were detected. Testing of the new well and background well should include selected volatiles, semi-volatiles, phenols, pesticides and herbicides, PCBs and additional metals and non-metals.

The existing wells and the new well should be re-surveyed and the depth to water accurately measured to better determine the ground water gradient in the area.

At this time, we anticipate that additional work at the site will be conducted next spring or summer.

Please feel free to comment on the data and discussion presented herein. Your input would be greatly appreciated.

Very truly yours,

DAMSCHEN & ASSOCIATES, INC.

Curt Coover
Project Hydrogeologist

cc: Jim Leiter, Solid & Hazardous Waste Bureau

The sampling program presented herein should be repeated again next fall if a new ground water monitoring program has not been accomplished.

As part of the work plan identified in our September 8, 1982 letter, we still recommend drilling of another monitoring well at the site. Based on the information presented here, this well should be installed west of the landfill. This concurs with recommendations of the California National Forest.

Testing of the new well should include a broad suite of compounds, especially organic compounds. Previous testing of organic compounds at the site was limited to chlorinated pesticides and herbicides and none were detected. Testing of the new well and background well should include selected volatile, semi-volatile, phenols, pesticides and herbicides, PCBs and additional metals and non-metals.

The existing wells and the new well should be re-surveyed and the depth to water accurately measured to better determine the ground water gradient in the area.

At this time, we anticipate that additional work at the site will be conducted next spring or summer.

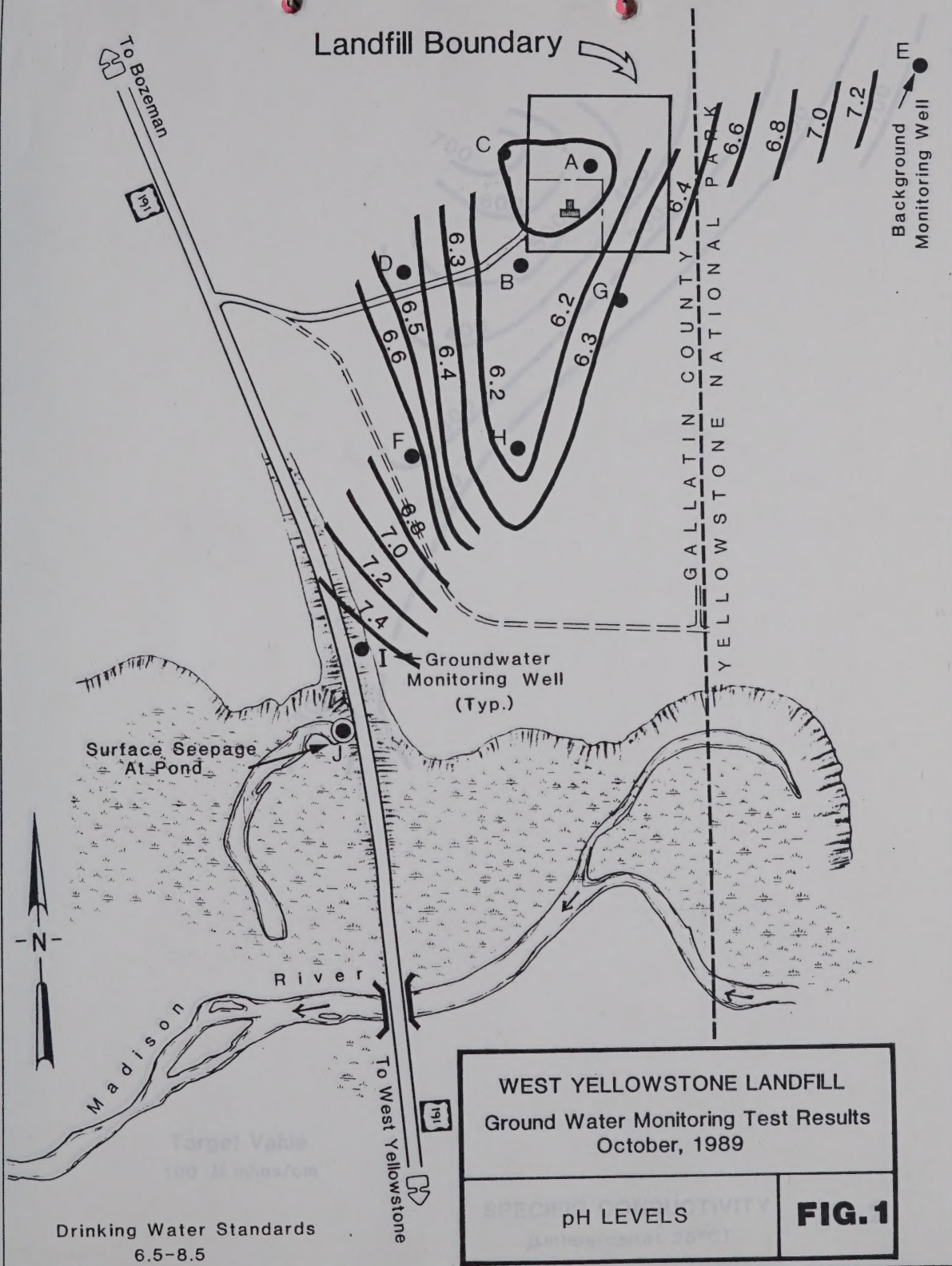
Please feel free to comment on the data and discussion presented herein. Your input would be greatly appreciated.

Very truly yours,

BARBARA A. ANDERSON, INC.

Chief Geologist
Project Hydrogeologist

cc: Mr. Lister, Santa Ana Mountains Water Bureau



mi
flow direction

Landfill Boundary

ATLANTIC OCEAN

Groundwater
Monitoring Well
(TW-1)

Surface Groundwater
At Point

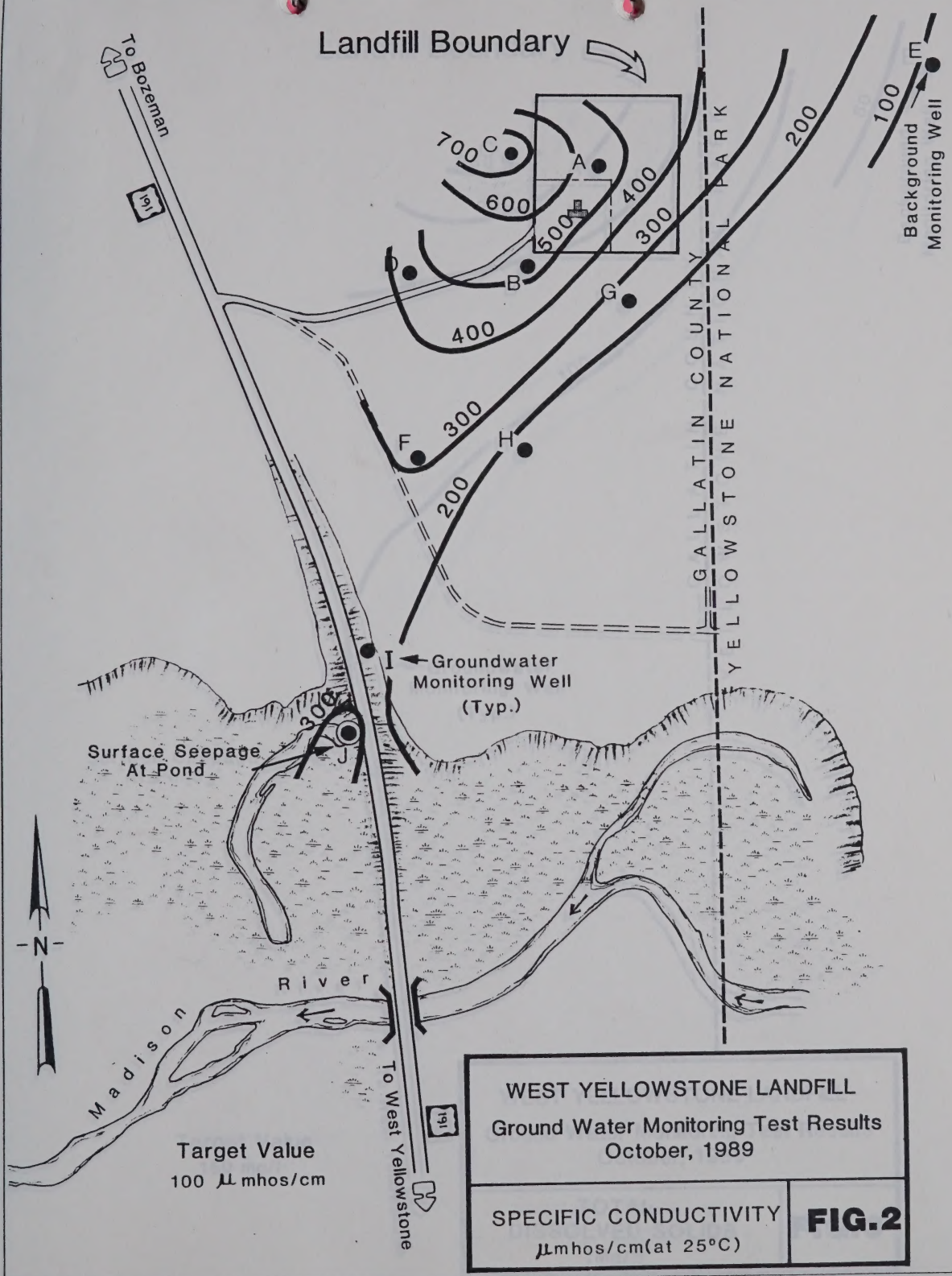
To West Yellowknife

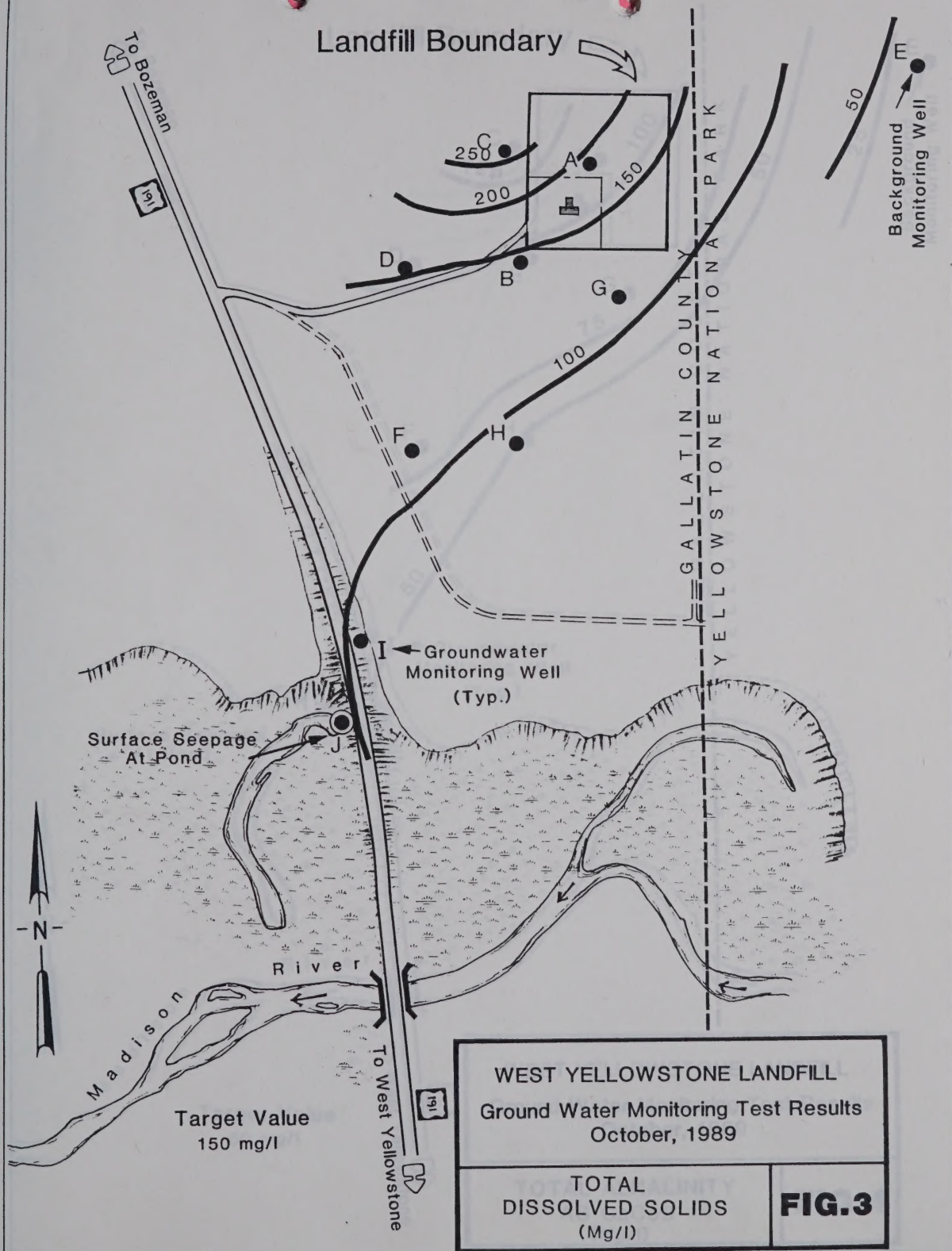
WEST YELLOWSTONE LANDFILL
Ground Water Monitoring Test Results
October, 1989

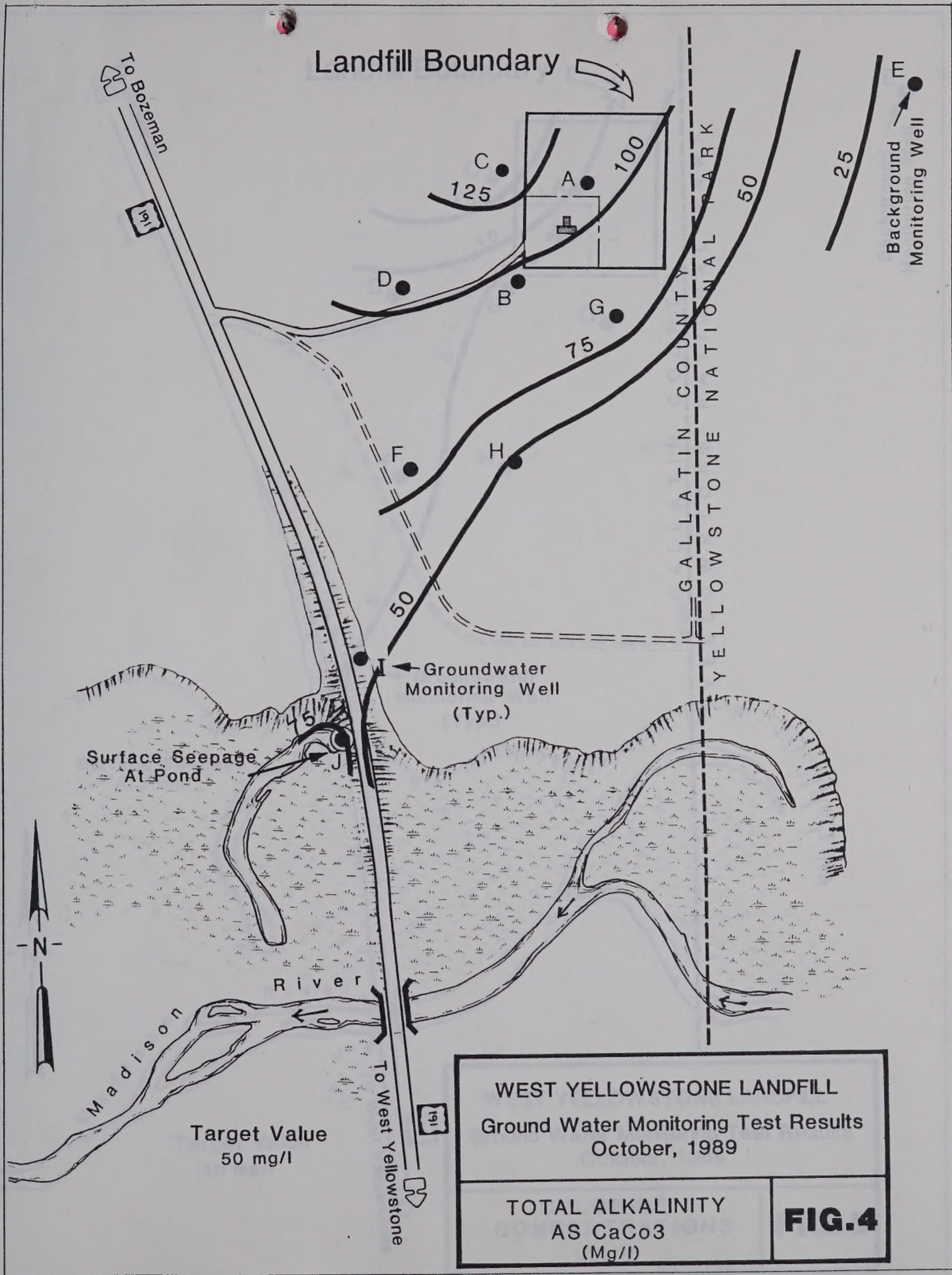
PH LEVELS

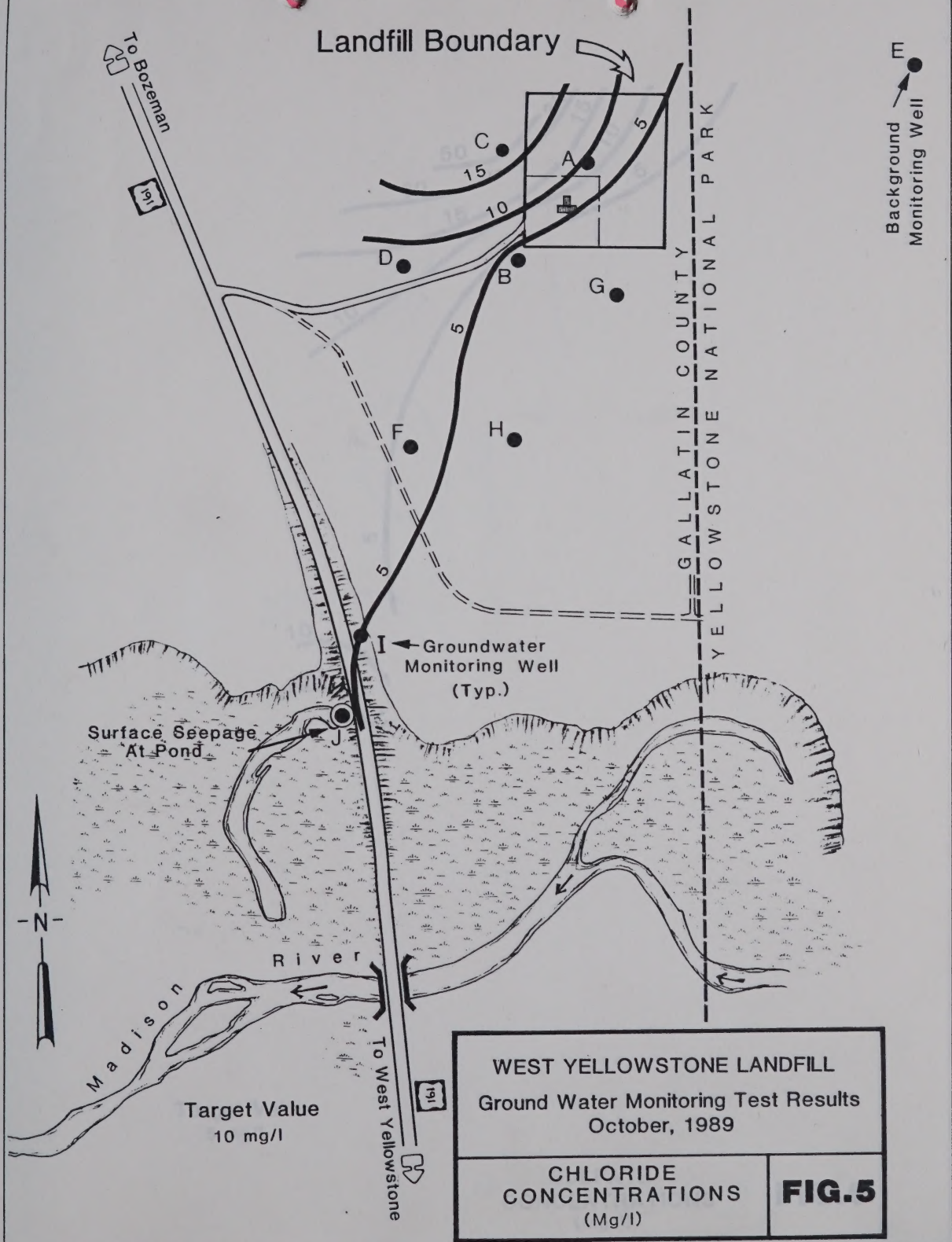
FIG. 1

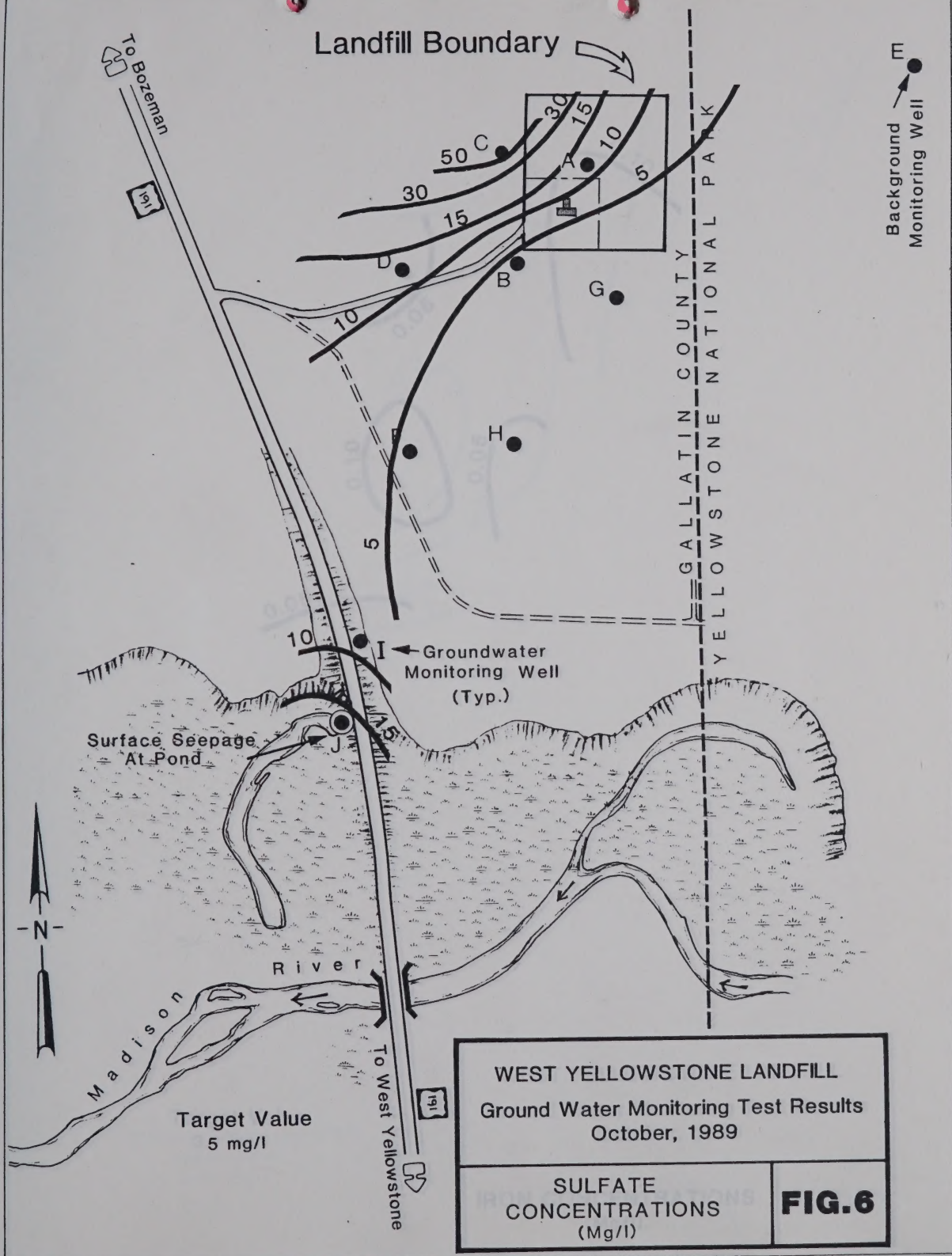


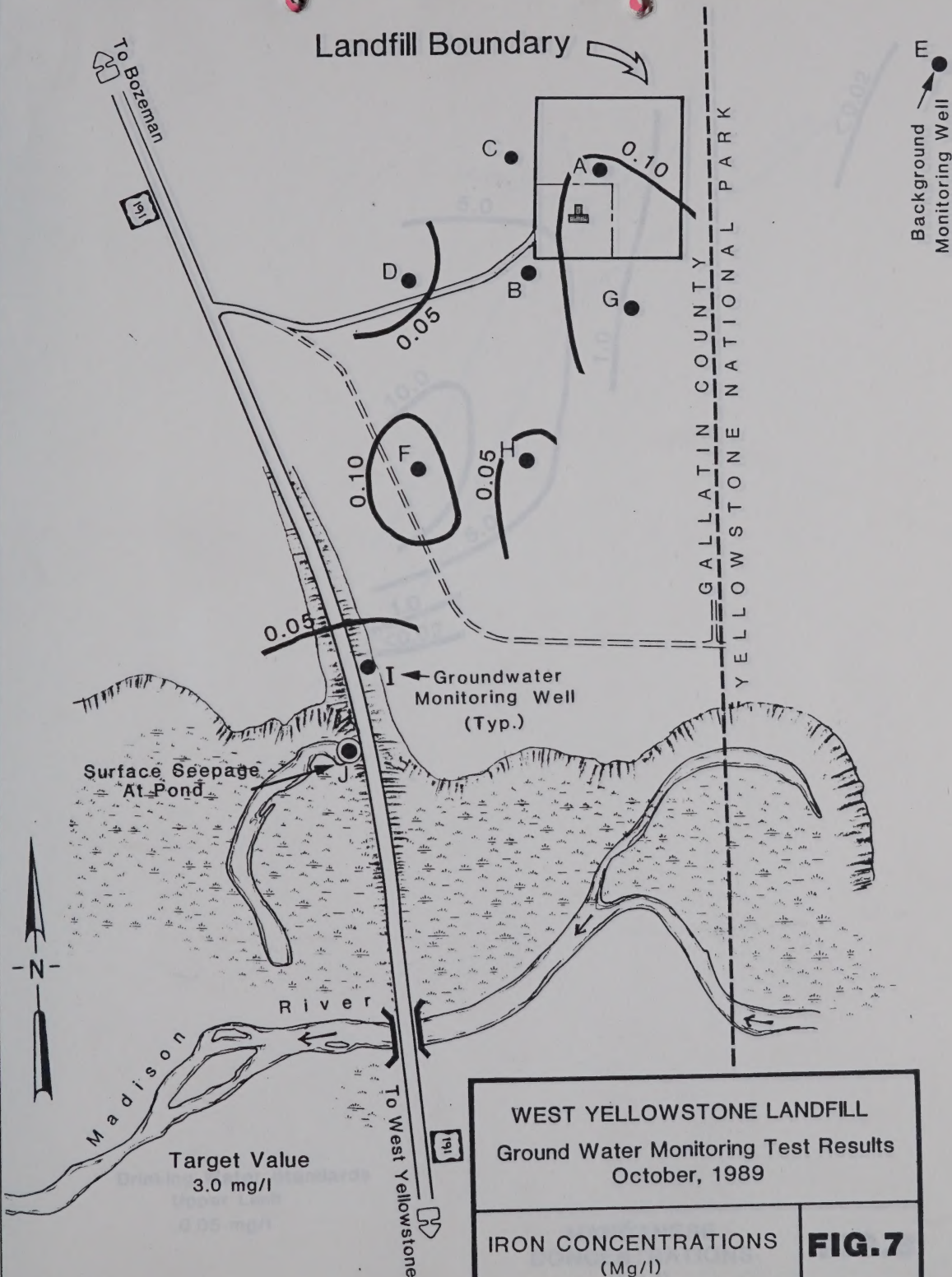


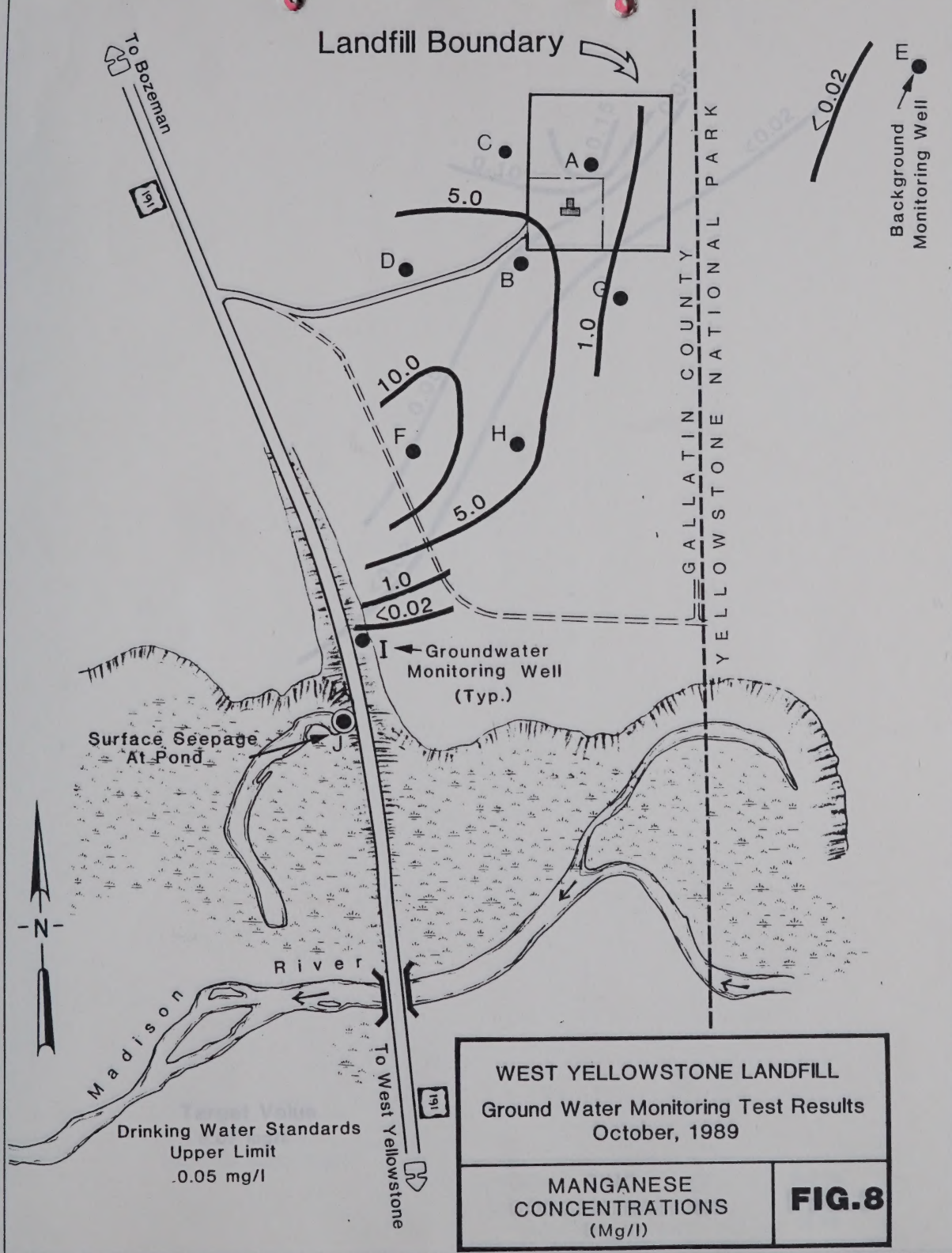


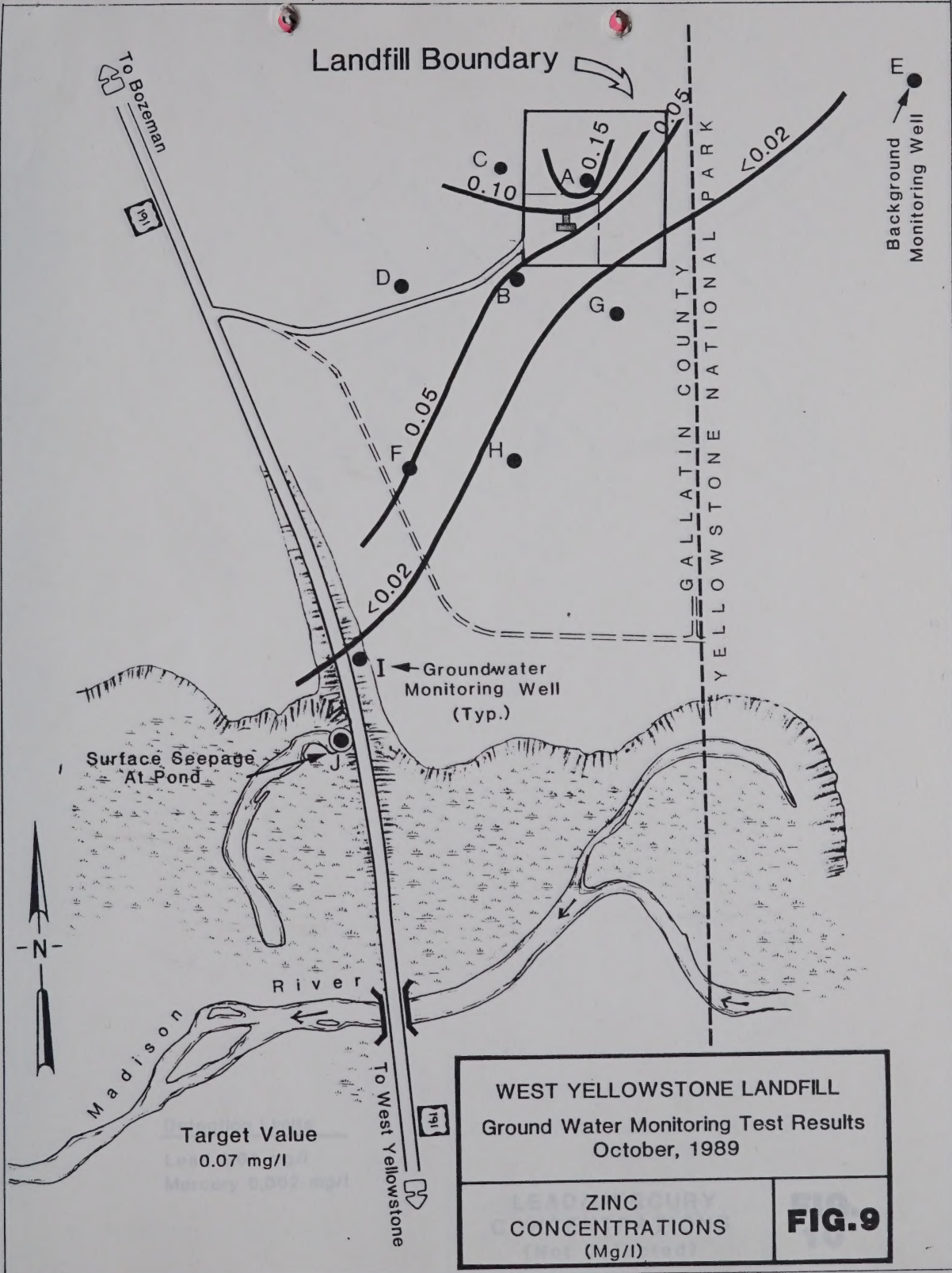


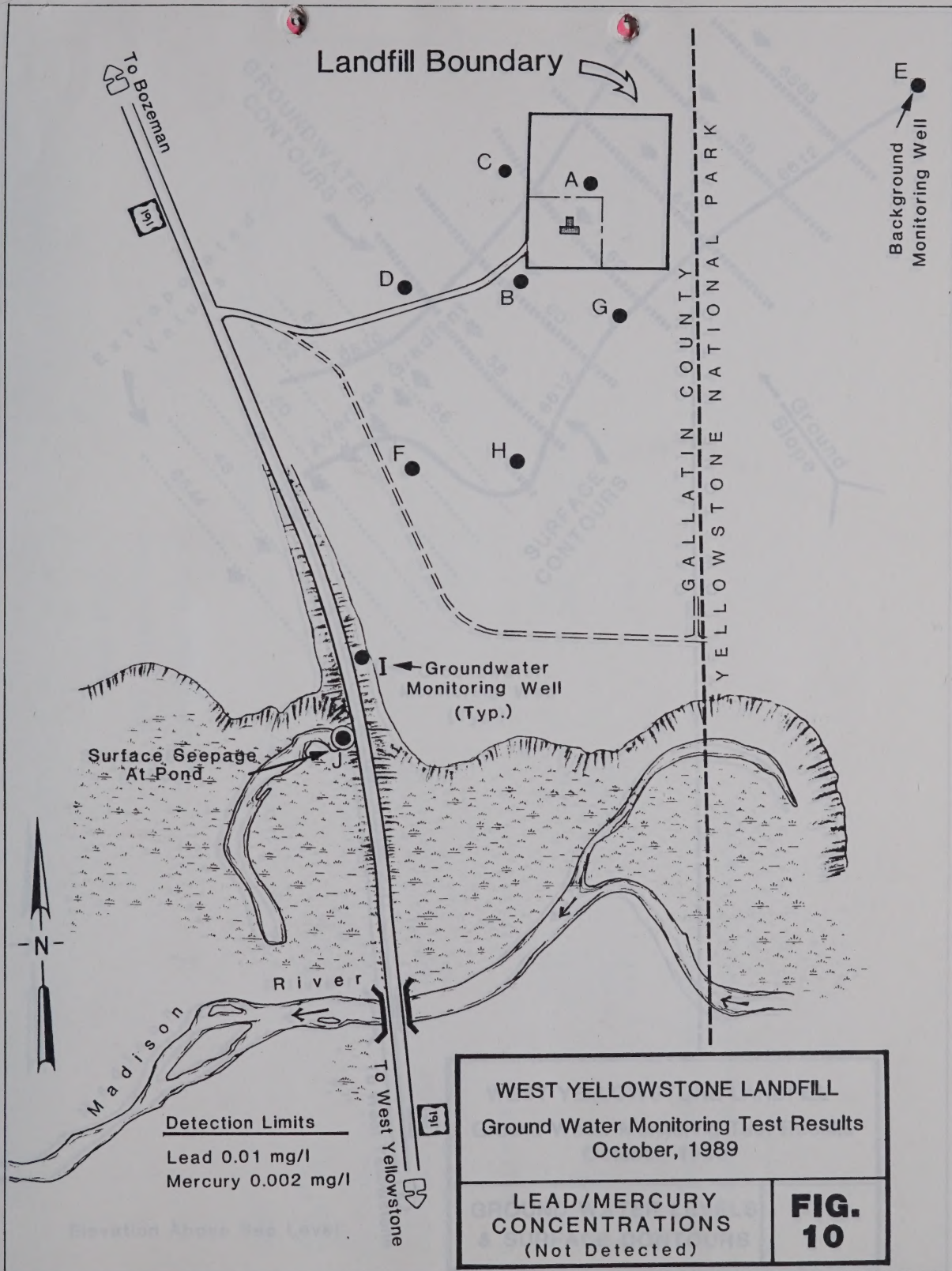












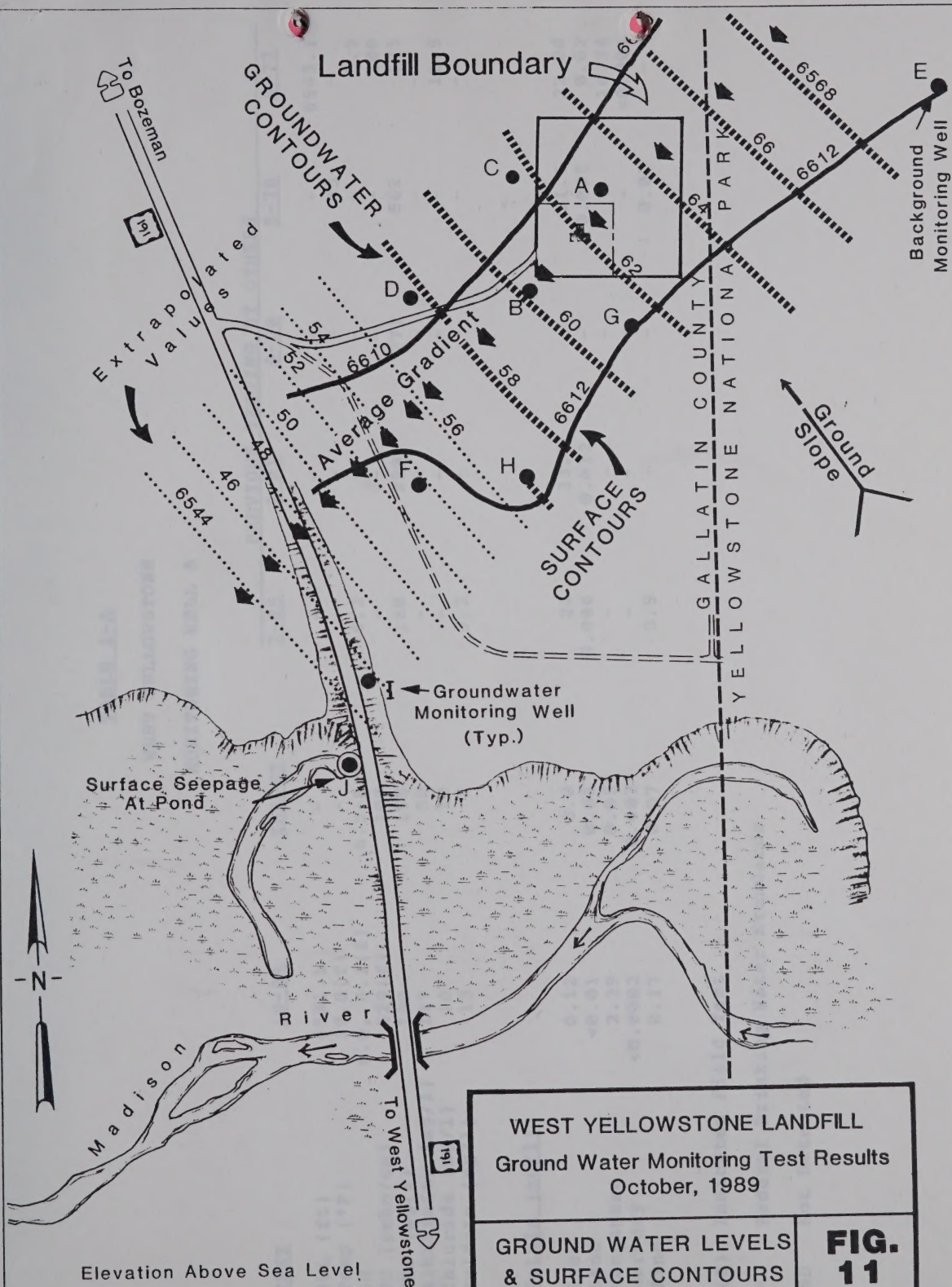


TABLE 1-A
WEST YELLOWSTONE
MONITORING WELL A

<u>TEST</u>	<u>10-89</u>	<u>TARGET</u>	<u>PREVIOUS TESTING BY OTHERS</u>				
			<u>7-85</u>	<u>7-81</u>	<u>6-80</u>	<u>8-78</u>	<u>9-77</u>
SWL (ft)	6531.1	-	-	-	-	-	6563.1
Temp (°F)	39.8(f)	-	-	-	-	43	-
pH	6.0, 6.1(f)	6.5-8.5*	6.2	-	-	-	5.9
SC (µmho/cm)	529(f)	100	-	-	-	-	300
TDS (mg/l)	190	150	180	290	277	562	175
Alkalinity (mg/l)	117	50	-	-	-	-	-
Chloride (mg/l)	10	10	-	-	-	-	12.5
Sulfate (mg/l)	13	5	5.2	-	-	-	-
<u>Metals (mg/l)</u>							
Iron	0.12	3.0	24	33.9	-	91.6	22.08
Lead	<0.01	0.05	0.004	0.012	-	0.005	0.02
Manganese	2.39	0.05*	-	-	-	-	16.24
Mercury	<0.0002	0.002*	-	-	-	-	<0.001
Zinc	0.17	0.07	8.9	-	-	0.07	-

(f) Indicates Field Test

* Federal Drinking Water Standards

ND Not Detected

TABLE 1-B
WEST YELLOWSTONE
MONITORING WELL B

<u>TEST</u>	<u>10-89</u>	<u>TARGET</u>	<u>PREVIOUS TESTING BY OTHERS</u>				
			<u>7-85</u>	<u>7-81</u>	<u>6-80</u>	<u>8-78</u>	<u>9-77</u>
SWL (ft)	6560.1	-	-	-	-	-	6559.4
Temp (°F)	42.6(f)	-	-	-	-	41	-
pH	5.9, 6.1(f)	6.5 - 8.5	6.3	-	-	-	6.5
SC (µmho/cm)	506(f)	100	-	-	-	-	290
TDS (mg/l)	139	150	235	230	225	201	330
Alkalinity (mg/l)	94	50	-	-	-	-	183
Chloride (mg/l)	4	10	4.8	-	-	-	8.0
Sulfate (mg/l)	3	5	2.4	-	-	-	7.0
<u>Metals (mg/l)</u>							
Iron	0.08	3.0	-	-	-	-	7.5
Lead	<0.01	0.05	0.002	0.007	-	0.015	0.04
Manganese	8.06	0.05*	-	-	-	-	68.8
Mercury	<0.0002	0.002*	-	-	-	-	0.003
Zinc	0.02	0.07	0.02	-	-	0.10	-

(f) Indicates Field Test

* Federal Drinking Water Standards

TABLE 1-C

WEST YELLOWSTONE
MONITORING WELL C

TEST	10-89	TARGET	PREVIOUS TESTING BY OTHERS				
			7-85	7-81	6-80	8-78	9-77
SWL (ft)	6561.5	-	-	-	-	-	6561.6
Temp (°F)	47.1(f)	-	-	-	-	41	-
pH	6.2, 6.1(f)	6.5-8.5*	6.3	-	-	-	5.8
SC (µmho/cm)	753(f)	100	-	-	-	-	300
TDS (mg/l)	263	150	343	200	192	530	230
Alkalinity (mg/l)	131	50	-	-	-	-	-
Chloride (mg/l)	19	10	23.9	-	-	-	25.0
Sulfate (mg/l)	54	5	ND	-	-	-	-
<u>Metals (mg/l)</u>							
Iron	0.07	3.0	-	-	-	-	-
Lead	<0.01	0.05	0.003	0.008	-	0.015	0.17
Manganese	3.81	0.05*	-	-	-	-	3.4
Mercury	<0.0002	0.002*	-	-	-	-	<0.001
Zinc	0.11	0.07	0.02	-	-	0.07	-

(f) Indicates Field Test

* Federal Drinking Water Standards

ND Not Detected

TABLE 1-D

WEST YELLOWSTONE

MONITORING WELL D

<u>TEST</u>	<u>10-89</u>	<u>TARGET</u>	<u>PREVIOUS TESTING BY OTHERS</u>				
			<u>7-85</u>	<u>7-81</u>	<u>6-80</u>	<u>8-78</u>	<u>9-77</u>
SWL (ft)	6557.6	-	-	-	-	-	6557.4
Temp (°F)	41.8(f)	-	-	-	-	41	-
pH	6.4, 6.5(f)	6.5 - 8.5*	6.4	-	-	-	7.1
SC (μmho/cm)	492(f)	100	-	-	-	-	440
TDS (mg/l)	161	150	240	190	188	201	345
Alkalinity (mg/l)	107	50	-	-	-	-	270
Chloride (mg/l)	9	10	11.5	-	-	-	8
Sulfate (mg/l)	12	5	ND	-	-	-	1
<u>Metals (mg/l)</u>							
Iron	0.03	3.0	1.5	22.1	-	0.8	44.06
Lead	<0.01	0.05	0.004	0.016	-	-	0.21
Manganese	8.07	0.05*	-	-	-	-	28.72
Mercury	<0.0002	0.002*	-	-	-	-	<0.001
Zinc	0.08	0.07	0.04	-	-	0.06	-

(f) Indicates Field Test

* Federal Drinking Water Standards

ND Not Detected

TABLE 1-E
WEST YELLOWSTONE
MONITORING WELL E

<u>TEST</u>	<u>10-89</u>	<u>TARGET</u>	<u>PREVIOUS TESTING BY OTHERS</u>				
			<u>7-85</u>	<u>7-81</u>	<u>6-80</u>	<u>8-78</u>	<u>9-77</u>
SWL (ft)	6570.3	-	-	-	-	-	6569.9
Temp (°F)	42.7(f)	-	-	-	-	41	-
pH	6.7, 7.4(f)	6.5 - 8.5*	6.6	-	-	-	6.9
SC (µmho/cm)	90(f)	100	-	-	-	-	60
TDS (mg/l)	31	150	75	70	67	64	75
Alkalinity (mg/l)	20	50	-	-	-	-	30
Chloride (mg/l)	2	10	1.0	-	-	-	3
Sulfate (mg/l)	3	5	2.8	-	-	-	1
<u>Metals (mg/l)</u>							
Iron	0.06	3.0	ND	ND	-	0.03	1.18
Lead	<0.01	0.05	0.002	0.012	-	0.005	0.11
Manganese	<0.02	0.05*	-	-	-	-	<0.05
Mercury	<0.0002	0.002*	-	-	-	-	<0.001
Zinc	<0.01	0.07	0.01	-	-	0.05	-

(f) Indicates Field Test

* Federal Drinking Water Standards

ND Not Detected

TABLE 1-F
WEST YELLOWSTONE
MONITORING WELL F

<u>TEST</u>	<u>10-89</u>	<u>TARGET</u>	<u>PREVIOUS TESTING BY OTHERS</u>				
			<u>7-85</u>	<u>7-81</u>	<u>6-80</u>	<u>8-78</u>	<u>9-77</u>
SWL (ft)	6553.7	-	-	-	-	-	6553.0
Temp (°F)	37.2(f)	-	-	-	-	43	-
pH	6.7, 6.6(f)	6.5 - 8.5*	6.2	-	-	-	6.0
SC (µmho/cm)	302(f)	100	-	-	-	-	90
TDS (mg/l)	128	150	270	20	52	82	75
Alkalinity (mg/l)	83	50	-	-	-	-	-
Chloride (mg/l)	7	10	8.6	-	-	-	5.0
Sulfate (mg/l)	4	5	ND	-	-	-	-
<u>Metals (mg/l)</u>							
Iron	0.10	3.0	6.0	ND	-	0.03	9.44
Lead	<0.01	0.05	ND	ND	-	0.042	0.03
Manganese	13.9	0.05*	-	-	-	-	1.16
Mercury	<0.0002	0.002*	-	-	-	-	<0.001
Zinc	0.05	0.07	ND	-	-	0.11	-

(f) Indicates Field Test

* Federal Drinking Water Standards

ND Not Detected

TABLE 1-G
WEST YELLOWSTONE
MONITORING WELL G

<u>TEST</u>	<u>10-89</u> **	<u>TARGET</u>	<u>PREVIOUS TESTING BY OTHERS</u>				
			<u>7-85</u>	<u>7-81</u>	<u>6-80</u>	<u>8-78</u>	<u>9-77</u>
SWL (ft)	6561.0	-	-	-	-	-	6560.4
Temp (°F)	40.4 (f)	-	-	-	-	41	-
pH	6.3, 6.4 (f)	6.5 - 8.5*	6.2	-	-	-	6.0
SC (µmho/cm)	285(f)	100	-	-	-	-	73
TDS (mg/l)	135	150	110	40	58	80	60
Alkalinity (mg/l)	89	50	-	-	-	-	-
Chloride (mg/l)	1.5	10	1.0	-	-	-	5.0
Sulfate (mg/l)	1	5	1.0	-	-	-	-
<u>Metals (mg/l)</u>							
Iron	0.55	3.0	ND	0.24	-	0.01	10.49
Lead	<0.01	0.05	ND	0.010	-	0.006	<0.01
Manganese	0.06	0.05*	-	-	-	-	2.15
Mercury	<0.0002	0.002*	-	-	-	-	<0.001
Zinc	<0.01	0.07	ND	-	-	0.01	-

(f) Indicates Field Test

* Federal Drinking Water Standards

** Laboratory Results Are An Average Of Two Analyses

ND Not Detected

TABLE 1-H
WEST YELLOWSTONE
MONITORING WELL H

<u>TEST</u>	<u>10-89</u>	<u>TARGET</u>	<u>PREVIOUS TESTING BY OTHERS</u>				
			<u>7-85</u>	<u>7-81</u>	<u>6-80</u>	<u>8-78</u>	<u>9-77</u>
SWL (ft)	6557.2	-	-	-	-	-	6555.6
Temp (°F)	43.0(f)	-	-	-	-	41	-
pH	6.3, 6.1(f)	6.5 - 8.5*	6.4	-	-	-	6.1
SC (μmho/cm)	158(f)	100	-	-	-	-	65
TDS (mg/l)	78	150	170	50	59	76	50
Alkalinity (mg/l)	42	50	-	-	-	-	-
Chloride (mg/l)	3	10	7.7	-	-	-	5.0
Sulfate (mg/l)	2	5	ND	-	-	-	-
<u>Metals (mg/l)</u>							
Iron	<0.03	3.0	ND	ND	-	0.03	9.93
Lead	<0.01	0.05	0.002	0.028	-	-	0.02
Manganese	7.87	0.05*	-	-	-	-	1.4
Mercury	<0.0002	0.002*	-	-	-	-	<0.001
Zinc	<0.01	0.07	ND	-	-	0.04	-

(f) Indicates Field Test

* Federal Drinking Water Standards

ND Not Detected

TABLE 1-I
WEST YELLOWSTONE
MONITORING WELL I

<u>TEST</u>	<u>10-89</u>	<u>TARGET</u>	<u>PREVIOUS TESTING BY OTHERS</u>				
			<u>7-85</u>	<u>7-81</u>	<u>6-80</u>	<u>8-78</u>	<u>9-77</u>
SWL (ft)	6545.0	-	-	-	-	-	6545.55
Temp (°F)	42.7 (f)	-	-	-	-	48	-
pH	7.0, 7.6(f)	6.5 - 8.5*	6.4	-	-	-	6.3
SC (µmho/cm)	260(f)	100	-	-	-	-	105
TDS (mg/l)	82	150	210	40	70	90	80
Alkalinity (mg/l)	53	50	-	-	-	-	-
Chloride (mg/l)	5	10	27.8	-	-	-	5.0
Sulfate (mg/l)	9	5	ND	-	-	-	-
<u>Metals (mg/l)</u>							
Iron	0.04	3.0	ND	ND	-	0.03	16.55
Lead	<0.01	0.05	ND	0.032	-	0.005	0.02
Manganese	<0.02	0.05*	-	-	-	-	2.44
Mercury	<0.0002	0.002*	-	-	-	-	<0.001
Zinc	<0.01	0.07	0.03	-	-	0.06	-

(f) Indicates Field Test

* Federal Drinking Water Standards

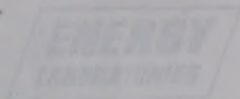
ND Not Detected

TABLE 1-J
WEST YELLOWSTONE
MONITORING POINT J

<u>TEST</u>	<u>10-89</u>	<u>TARGET</u>	<u>PREVIOUS TESTING BY OTHERS</u>				
			<u>7-85</u>	<u>7-81</u>	<u>6-80</u>	<u>9-12-77</u>	<u>9-8-77</u>
SWL (ft)	-	-	-	-	-	-	6542.8
Temp (°F)	46.5(f)	-	-	-	-	-	-
pH	7.2, 7.6(f)	6.5 - 8.5*	-	-	-	6.5	6.5
SC (µmho/cm)	372(f)	100	-	-	-	-	90
TDS (mg/l)	133	150	-	-	-	140	95
Alkalinity (mg/l)	83	50	-	-	-	68	-
Chloride (mg/l)	9	10	-	-	-	2.4	5.0
Sulfate (mg/l)	17	5	-	-	-	3	-
<u>Metals (mg/l)</u>							
Iron	<0.03	3.0	-	-	-	0.36	0.06
Lead	<0.01	0.05	-	-	-	-	<0.01
Manganese	<0.02	0.05*	-	-	-	0.10	<0.05
Mercury	<0.0002	0.002*	-	-	-	-	<0.001
Zinc	<0.01	0.07	-	-	-	-	-

(f) Indicates Field Test

* Federal Drinking Water Standards



ENERGY LABORATORIES, INC.



P.O. BOX 1000 • 1000 WINDY BROOKWAY • BILLINGS, MT 59107-0000 • PHONE (406) 592-6700
FAX (406) 592-6700

LABORATORY REPORT

TO: Derachon and Associates, Inc.
ADDRESS: Curt Coover
P.O. Box 4507
Hanna, MT 59804

LAB NO.: 88-17304
DATE: 11/05/88

WATER ANALYSIS

West Yellowstone Monitoring
APPENDIX A
Sample 100009 @ 5:00 p.m.
Submitted 10/11/88

LABORATORY REPORTS

Conductivity	250
pH, 25°C	8.0
Total Dissolved Solids @ 180°C	180
Total Alkalinity as CaCO ₃	117
Chloride	10
Sulfate	3
Unions	
Iron	0.12
Lead	0.00
Manganese	0.00
Mercury (by mass)	<0.0001
Zinc	0.17



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800-873-5227

LABORATORY REPORT

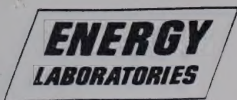
TO: Damschen and Associates, Inc.
ADDRESS: Curt Coover
P.O. Box 4817
Helena, MT 59604

LAB NO.: 89-17304
DATE: 11/09/89 dya

WATER ANALYSIS

West Yellowstone Monitoring
A, Inside Compound
Sampled 10/04/89 @ 6:00 p.m.
Submitted 10/11/89

<u>Constituent</u>	<u>mg/l</u>
pH, s.u.	6.0
Total Dissolved Solids @ 180°C	190
Total Alkalinity as CaCO ₃	117
Chloride	10
Sulfate	13
<u>Metals:</u>	
Iron	0.12
Lead	<0.01
Manganese	2.39
Mercury (low-level)	<0.0002
Zinc	0.17



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LABORATORY REPORT

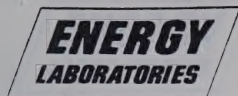
TO: Damschen and Associates, Inc.
ADDRESS: Curt Coover
P.O. Box 4817
Helena, MT 59604

LAB NO.: 89-17305
DATE: 11/09/89 dya

WATER ANALYSIS

West Yellowstone Monitoring
B, SW Corner
Sampled 10/05/89 @ 12:30 p.m.
Submitted 10/11/89

<u>Constituent</u>	<u>mg/l</u>
pH, s.u.	5.9
Total Dissolved Solids @ 180°C	139
Total Alkalinity as CaCO ₃	94
Chloride	4
Sulfate	3
<u>Metals:</u>	
Iron	0.08
Lead	<0.01
Manganese	8.06
Mercury (low-level)	<0.0002
Zinc	0.02



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LABORATORY REPORT

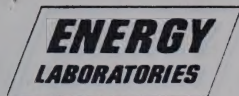
TO: Damschen and Associates, Inc.
ADDRESS: Curt Coover
P.O. Box 4817
Helena, MT 59604

LAB NO.: 89-17306
DATE: 11/09/89 dya

WATER ANALYSIS

West Yellowstone Monitoring
C, West of Fence
Sampled 10/05/89 @ 11:00 a.m.
Submitted 10/11/89

<u>Constituent</u>	<u>mg/l</u>
pH, s.u.	6.2
Total Dissolved Solids @ 180°C	263
Total Alkalinity as CaCO ₃	131
Chloride	19
Sulfate	54
<u>Metals:</u>	
Iron	0.07
Lead	<0.01
Manganese	3.81
Mercury (low-level)	<0.0002
Zinc	0.11



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LABORATORY REPORT

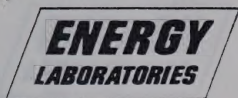
TO: Damschen and Associates, Inc.
ADDRESS: Curt Coover
P.O. Box 4817
Helena, MT 59604

LAB NO.: 89-17307
DATE: 11/09/89 dya

WATER ANALYSIS

West Yellowstone Monitoring
D, West of Weigh Station
Sampled 10/05/89 @ 11:30 a.m.
Submitted 10/11/89

<u>Constituent</u>	<u>mg/l</u>
pH, s.u.	6.4
Total Dissolved Solids @ 180°C	161
Total Alkalinity as CaCO3	107
Chloride	9
Sulfate	12
<u>Metals:</u>	
Iron	0.03
Lead	<0.01
Manganese	8.07
Mercury (low-level)	<0.0002
Zinc	0.08



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LABORATORY REPORT

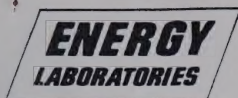
TO: Damschen and Associates, Inc.
ADDRESS: Curt Coover
P.O. Box 4817
Helena, MT 59604

LAB NO.: 89-17308
DATE: 11/09/89 dya

WATER ANALYSIS

West Yellowstone Monitoring
E, Background-Inside Park
Sampled 10/04/89 @ 4:00 p.m.
Submitted 10/11/89

<u>Constituent</u>	<u>mg/l</u>
pH, s.u.	6.7
Total Dissolved Solids @ 180°C	31
Total Alkalinity as CaCO ₃	20
Chloride	2
Sulfate	3
Oil and Grease	<1
<u>Metals:</u>	
Iron	0.06
Lead	<0.01
Manganese	<0.02
Mercury (low-level)	<0.0002
Zinc	<0.01



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LABORATORY REPORT

TO: Damschen and Associates, Inc.
ADDRESS: Curt Coover
P.O. Box 4817
Helena, MT 59604

LAB NO.: 89-17309
DATE: 11/09/89 dya

WATER ANALYSIS

West Yellowstone Monitoring
F, SW
Sampled 10/04/89 @ 7:00 p.m.
Submitted 10/11/89

<u>Constituent</u>	<u>mg/l</u>
pH, s.u.	6.7
Total Dissolved Solids @ 180°C	128
Total Alkalinity as CaCO ₃	83
Chloride	7
Sulfate	4
<u>Metals:</u>	
Iron	0.10
Lead	<0.01
Manganese	13.9
Mercury (low-level)	<0.0002
Zinc	0.05

LABORATORY REPORT

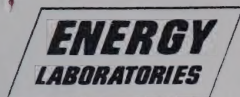
TO: Damschen and Associates, Inc.
ADDRESS: Curt Coover
P.O. Box 4817
Helena, MT 59604

LAB NO.: 89-17310
DATE: 11/09/89 dya

WATER ANALYSIS

West Yellowstone Monitoring
G, South
Sampled 10/04/89 @ 5:00 p.m.
Submitted 10/11/89

<u>Constituent</u>	<u>mg/l</u>
pH, s.u.	6.3
Total Dissolved Solids @ 180°C	130
Total Alkalinity as CaCO ₃	89
Chloride	1
Sulfate	1
<u>Metals:</u>	
Iron	0.55
Lead	<0.01
Manganese	0.06
Mercury (low-level)	<0.0002
Zinc	<0.01



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LABORATORY REPORT

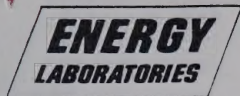
TO: Damschen and Associates, Inc.
ADDRESS: Curt Coover
P.O. Box 4817
Helena, MT 59604

LAB NO.: 89-17310 dup
DATE: 11/09/89 dya

QUALITY ASSURANCE - DUPLICATE ANALYSIS

West Yellowstone Monitoring
G, South
Sampled 10/04/89 @ 5:00 p.m.
Submitted 10/11/89

<u>Constituent</u>	<u>mg/l</u>
pH, s.u.	6.3
Total Dissolved Solids @ 180°C	140
Total Alkalinity as CaCO ₃	89
Chloride	2
Sulfate	1
<u>Metals:</u>	
Iron	0.54
Lead	<0.01
Manganese	0.06
Mercury (low-level)	<0.0002
Zinc	<0.01



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LABORATORY REPORT

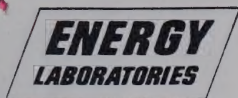
TO: Damschen and Associates, Inc.
ADDRESS: Curt Coover
P.O. Box 4817
Helena, MT 59604

LAB NO.: 89-17311
DATE: 11/09/89 dya

WATER ANALYSIS

West Yellowstone Monitoring
H, East of Fence
Sampled 10/05/89 @ 10:00 a.m.
Submitted 10/11/89

<u>Constituent</u>	<u>mg/l</u>
pH, s.u.	6.3
Total Dissolved Solids @ 180°C	78
Total Alkalinity as CaCO ₃	42
Chloride	3
Sulfate	2
<u>Metals:</u>	
Iron	<0.03
Lead	<0.01
Manganese	7.87
Mercury (low-level)	<0.0002
Zinc	<0.01



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LABORATORY REPORT

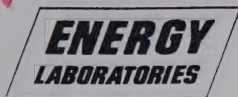
TO: Damschen and Associates, Inc.
ADDRESS: Curt Coover
P.O. Box 4817
Helena, MT 59604

LAB NO.: 89-17311 spi
DATE: 11/09/89 dya

QUALITY ASSURANCE - SPIKED ANALYSIS

West Yellowstone Monitoring
H, East of Fence
Sampled 10/05/89 @ 10:00 a.m.
Submitted 10/11/89

<u>Constituent</u>	<u>% Recovery</u>
pH, s.u.	N/A
Total Dissolved Solids @ 180°C	N/A
Total Alkalinity as CaCO ₃	N/A
Chloride	99
Sulfate	99
<u>Metals:</u>	
Iron	100
Lead	102
Manganese	104
Mercury (low-level)	100
Zinc	106



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LABORATORY REPORT

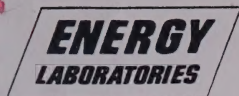
TO: Damschen and Associates, Inc.
ADDRESS: Curt Coover
P.O. Box 4817
Helena, MT 59604

LAB NO.: 89-17312
DATE: 11/09/89 dya

WATER ANALYSIS

West Yellowstone Monitoring
I, Road
Sampled 10/04/89 @ 2:00 p.m.
Submitted 10/11/89

<u>Constituent</u>	<u>mg/l</u>
pH, s.u.	7.0
Total Dissolved Solids @ 180°C	82
Total Alkalinity as CaCO ₃	53
Chloride	5
Sulfate	9
<u>Metals:</u>	
Iron	0.04
Lead	<0.01
Manganese	<0.02
Mercury (low-level)	<0.0002
Zinc	<0.01



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LABORATORY REPORT

TO: Damschen and Associates, Inc.
ADDRESS: Curt Coover
P.O. Box 4817
Helena, MT 59604

LAB NO.: 89-17313
DATE: 11/09/89 dya

WATER ANALYSIS

West Yellowstone Monitoring
J, Seep
Sampled 10/04/89 @ 3:00 p.m.
Submitted 10/11/89

<u>Constituent</u>	<u>mg/l</u>
pH, s.u.	7.2
Total Dissolved Solids @ 180°C	133
Total Alkalinity as CaCO ₃	83
Chloride	9
Sulfate	17
<u>Metals:</u>	
Iron	<0.03
Lead	<0.01
Manganese	<0.02
Mercury (low-level)	<0.0002
Zinc	<0.01

CLOSED
WEST YELLOWSTONE HEBGEN BASIN
SOLID WASTE DISTRICT
LICENSE NUMBER 237

DAMSCHEN & ASSOCIATES

OCTOBER 1989 GROUND WATER
MONITORING RESULTS

DECEMBER 1989

IS LOCATED IN THE GROUNDWATER
MONITORING REPORTS ARCHIVE,
BOX NUMBER 2

RECEIVED 12/20/1989

WEST YELLOWSTONE HERBEN BASIN
SOLID WASTE DISTRICT
LICENSE NUMBER 217

DANIELSON & ASSOCIATES

OCTOBER 1989 GROUND WATER
MONITORING RESULTS

DECEMBER 1989

IS LOCATED IN THE GROUNDWATER
MONITORING REPORTS ARCHIVE
BOX 21 (1989)

DECEMBER 1989

CLOSED
WEST YELLOWSTONE HEBGEN BASIN
SOLID WASTE DISTRICT
LICENSE NUMBER 237

WEST YELLOWSTONE/HEBGEN BASIN
SOLID WASTE DISTRICT

JULY 1985 TEST RESULTS AND SUMMARY

NOVEMBER 1985

IS LOCATED IN THE GROUNDWATER
MONITORING REPORTS ARCHIVE,
BOX NUMBER 2

RECEIVED 1/23/1986

CLOSED
WEST YELLOWSTONE HEBGEN BASIN
SOLID WASTE DISTRICT
LICENSE NUMBER 237

MONITORING RECORDS 1976-1985

1985

IS LOCATED IN THE GROUNDWATER
MONITORING REPORTS ARCHIVE,
BOX NUMBER 2

RECEIVED ?

Initials Date 11/14/96
SOLID WASTE PROGRAM ROUTE SLIP

**ENVIRONMENTAL QUALITY
 COMPLIANCE DIVISION
 SITE PROGRAM**

Metcalf Building

MONTANA

PO Box 200901
 Helena, MT 59620-0901

☐ **NEW APPLICATION**

Initial / Date

Jim W.
 Jon D.
 Proof
 Cathy
 Roger

☐ **NEW LICENSE**

Initial / Date

Jim W.
 Jon D.
 Proof
 Carol
 Cathy
 Roger

☐ **HEALTH OFFICER CARD**

Initial / Date

Jim W.
 Carol
 Cathy

☐ **INSPECTIONS**

Initial / Date

Pat C.
 Jon D.
 Proof
 Carol
 Roger

☐ **INTERIM CLOSURES**

Initial / Date

Jim W.
 Jon D.
 Proof
 Carol
 Cathy
 Roger

☐ **CLOSURES**

Initial / Date

Jim W.
 Jon D.
 Proof
 Carol
 Cathy
 Roger

☐ **CHANGE IN LICENSE
 FOR FEE STATUS**

Initial / Date

Jim W.
 Jon D.
 Proof
 Cathy
 Roger

☐ **COMPLAINTS**

Initial / Date

Pat C.
 Jon D.
 Proof
 Roger
 Carol (filing & DBase)

☐ **GENERAL CORRESPONDENCE**

Initial / Date

Pat C./Jim W.
 Jon D.
 Proof
 Roger

☐ **MISCELLANEOUS**

Initial / Date

Proof
Pat C
Jon D

FILL (CLOSED), GALLATIN COUNTY -

OF DAMSCHEN'S MEMO

memo indicating the County's suggested
 Yellowstone Class II Landfill (closed). At this
 sessions in Mr. Barry Damschen's memo dated
 may be discontinued at the Board's discretion.
 supplement monitoring requirements in the future

anger District, P.O. Box 520, West Yellowstone, MT

Box 520, West Yellowstone, MT 59758
 Health Officer, 311 W. Main, Room 4, Bozeman, MT
 MT 59604

corresp)

"UNITY EMPLOYER"

gall.wye

GALLATIN
 #237cl

DEPARTMENT OF REVENUE

INLAND REVENUE

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DAMSCHEN & ASSOCIATES, INC.

CONSULTING ENGINEERS

2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604

TELEPHONE (406) 449-8627

FACSIMILE (406) 449-8631

File: Gallatin Co
W. Yellowstone (closed) with
grd wtr.

Memorandum

NOV 13 1996
Montana Department of
Environmental Quality
Waste Management Division

To: Pat Potts, Montana DEQ, Waste Management Division
Pat Hesch, US Forest Service

From: Barry Damschen, Damschen & Associates

Date: November 7, 1996

Subject: West Yellowstone Waste Disposal System
Groundwater Monitoring

As you are aware, our firm was retained by the West Yellowstone/Hebgen Basin Solid Waste District to conduct two sets of groundwater monitoring at the referenced site. The two sampling events were conducted in November, 1995 and June 1996. The results of both rounds of sampling subsequently were sent to your offices.

On October 30 and 31, 1996 I was in West Yellowstone working on the multi-county composting feasibility study for which we are a subcontractor to Land & Water Consulting, Inc. I met with the Solid Waste Board the evening of October 30 and the groundwater monitoring issue was discussed.

After significant discussion concerning the results of the testing, the Board passed a motion requesting me to write this memorandum to each of you indicating the following:

The Board's intent at this time is to not conduct any further groundwater monitoring at the site in light of the following circumstances:

- a) Neither the current or the past regulations concerning landfills in Montana apply to this landfill due to the 1989 closure date and the small volumes of waste that were received.
- b) The State & US Forest Service requested two (2) sampling events for VOCs and this has correspondingly been completed. Although the test results did identify very low levels of VOCs, the results are well below any Human Health Standards or MCL's. Also there are no direct users of the groundwater down-gradient from the landfill.

c) The landfill essentially stopped taking Group II wastes in the early 1980's and officially was covered and closed in 1989. The test results for the parameters that have been measured since the late 1970's have not shown any appreciable increase and in many cases have stabilized or decreased. Correspondingly, the landfill has been closed for 7 years and the Board feels that no major contamination plume has been evidenced to date.

As I previously mentioned, the Board asked me to transmit this correspondence and requested that I ask each of you to respond back to the Board (with a copy to me) of your conclusions. If you have any questions, please feel free to give me a call.

cc: West Yellowstone/Hebgen Basin Solid Waste District

WEST YELLOWSTONE SANITARY LANDFILL

BRIEF HISTORY OF LANDFILL OPERATION AND
GROUNDWATER MONITORING

*hand-out from Tom Keyes
@ 12/18/96
meeting.*

T. Keyes
9-30-96

A. LOCATION

1. The closed landfill is located on Forest Service land, approximately 4 miles north of West Yellowstone, MT. The landfill is located 1,000 feet east of Highway 191, and approximately 2,000 feet from the Madison River.
2. A solid waste transfer facility is currently in operation at the site (special use permit).

B. LANDFILL AND TRANSFER STATION OPERATION

1. The landfill was opened for use in 1971. A special use permit was issued to the City of West Yellowstone at that time. The city leased the site to a private contractor.
2. 8/17/76: Letter from State Solid Waste Management Bureau to Gallatin National Forest stated that the landfill operation was commendable and one of the best landfill operations in the State.
3. 1982: Class II (household wastes) landfill operation ceased.
4. 1983-1984: Solid waste transfer facility constructed. Class III (trees, vehicles, demolition materials) landfill operation continued.
5. 1988: Class III landfill closed. Soil cap installed. Burying of solid waste at site no longer permitted.
6. 6/94: Special Use Permit granted to West Yellowstone/Hebgen Basin Solid Waste District to continue operation of the transfer facility. Permit required testing for VOC's at closed landfill site.

C. SUMMARY OF GROUNDWATER MONITORING COMPLETED TO DATE

1. 1976: State requires that all existing landfills be evaluated to ensure that the sites comply with current siting requirements. Gallatin County Commissioners contacted the Soil Conservation Service to evaluate landfills in Gallatin County. In August, 1976, the SCS drilled two test holes at the site. Inorganic samples indicated possible leachate to groundwater.
2. 8/77: Forest Service (Harry Kringler) and SCS personnel drill nine 4" monitoring wells near landfill site. The wells are 44 to 62 feet deep. Depth to groundwater ranges from 40 to 60 feet. On average, the wells only extend into the aquifer approximately 2 feet. Inadequate drilling equipment prevented drilling and casing deeper into the aquifer.

3. 9/77: Forest Service sampling for TDS and inorganics shows a leachate plume in groundwater. Groundwater flow is toward Madison River.
4. 5/78-12/78: Eleven sampling events for TDS and inorganics completed by Forest Service.
5. 4/80: Forest Service Regional Office turns down Gallatin request for additional monitoring funds. RO recommends monitoring in some of the existing wells on a 3-year schedule. Did not approve additional wells.
6. 6/80: Forest Service samples for TDS, pH, spec. cond., COD, in all exist. wells.
7. 4/22/83: As part of licensing for transfer facility, State requires a monitoring program (as developed by Harry Kringler). Includes a 5-year testing interval starting in 1985. Includes 10 parameters, but no organics.
8. 7/30/85: Forest Service samples for TDS, Zn, Pb, Fe in all exist. wells.
9. 10/4/89: Solid Waste District samples for 10 parameters in all exist. wells.
10. 10/24/90: Solid Waste District samples for 10 parameters in all exist. wells.
11. 9/24/92: Solid Waste District samples for 10 parameters in all exist. wells.
12. 11/2/95: Solid Waste District samples for inorganics and VOC's. Low levels of three VOC's detected. All were lower than current State MCL for drinking water. Although there are some irregularities, consultant (Damschen & Assoc.) believes the concentration of metals has mitigated since 1977 (12/7/95 D&A memo to Pat Potts).
13. 6/7/96: Solid Waste District repeats sampling for inorganics and VOC's. Low levels of 4 VOC's detected. D&A believes there is a "fairly weak plume of leachate" emanating from the landfill and migrating in a southerly direction.

Initials

Date

9/11/96

SOLID WASTE PROGRAM ROUTE SLIP

☐ NEW APPLICATION

Initial / Date

Jim W.
Jon D.
Proof
Cathy
Roger

☐ NEW LICENSE

Initial / Date

Jim W.
Jon D.
Proof
Carol
Cathy
Roger

☐ HEALTH OFFICER CARD

Initial / Date

Jim W.
Carol
Cathy

☐ INSPECTIONS

Initial / Date

Pat C.
Jon D.
Proof
Carol
Roger

☐ INTERIM CLOSURES

Initial / Date

Jim W.
Jon D.
Proof
Carol
Cathy
Roger

☐ CLOSURES

Initial / Date

Jim W.
Jon D.
Proof
Carol
Cathy
Roger

☐ CHANGE IN LICENSE
FOR FEE STATUS

Initial / Date

Jim W.
Jon D.
Proof
Cathy
Roger

☐ COMPLAINTS

Initial / Date

Pat C.
Jon D.
Proof
Roger
Carol (filing & DBase)

☐ GENERAL CORRESPONDENCE

Initial / Date

Pat C./Jim W.
Jon D.
Proof
Roger

☒ MISCELLANEOUS

Initial / Date

Proof
Pat C
Jon D

CU 9-10
PPC 9-11
JD 9-11

to Tom (see yellow sticky) Mail 9-12-96

sw/galwyell.rem #237 Callatin Co.
w. Vellstine (closed)

MEMO

To: Carolyn DeMartino - DEQ Remediation
From: Pat Potts
Subject: Closed West Yellowstone Landfill (License No.237) - VOCs Detected in the Ground Water
Date: September 11, 1996

BRIEF HISTORY

The West Yellowstone Landfill was used for solid waste/refuse disposal from 1971 to 1988. Since 1988, Gallatin County has operated a transfer station at this location. Limited, intermittent ground water monitoring was conducted from 1976 to 1993. However, no definitive landfill leachate parameters, such as volatile organic compounds/chlorinated solvents/refrigerants were required to be analyzed.

The area where the old landfill and the presently active transfer station is located is owned by the Gallatin National Forest Service and has been leased by Gallatin County under a "special use" permit since 1971. This permit expired on December 31, 1993. In a "Decision Memo" (attachment) from the USDA/Gallatin Forest Service signed by Richard H. Inman for David P. Garber (Forest Supervisor) and dated June 20, 1994, it is emphasized that the County is required to conduct ground water analyses for VOCs as stipulated in the landfill closure plan.

CURRENT STATUS

Cis-1,2-dichloroethane (max. concentration = 21 ppb) has repeatedly been detected in the ground water in all three downgradient monitoring wells sampled in both the Fall 1995 and Spring 1996 sampling events which were required by the Forest Service. Vinyl chloride (0.17 ppb) was detected in one well (F) in the Fall 1995 event. Tetrachloroethene has been repeatedly detected at trace levels. Other VOCs sporadically detected from the two-time required sampling, at trace levels at this site were benzene and 1,4-dichlorobenzene (possibly associated with landfill/methane gas generation) [see attached Table].

Sampling QA/QC is questionable with regard to the extended time between sample collections and sample shipment. It is unclear as to the disposition of the samples during this time-frame.

The Program has contacted Pat Hesch with the Forest Service by telephone to discuss the results from these two VOC-sampling events. She informed me that Tom Keyes, the environmental person would contact me, but I have not heard from him. Existing solid waste regulations do not apply to this facility/site because the landfill closed prior to the promulgation of the ground water monitoring rules (1993).

MEMO

TO: [illegible]
FROM: [illegible]
SUBJECT: [illegible]

[illegible text block]

[illegible text block]

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[illegible text block]

Carolyn DeMartino - DEQ Remediation

Page 2

September 11, 1996

QUESTIONS

At what levels does CECRA enforce ground water clean-up? At a minimum, can CECRA require Gallatin County to be responsible for continued sampling to see if VOC concentrations show increase, decrease, or repeatability. Also, the extreme age of the monitoring wells, initial completion techniques, etc. should be considered in reviewing the overall integrity of the wells and the samples collected from them. It would be very helpful to install several new wells at this site, if continued monitoring is required.

DECISION MEMO

Table of selected analytical results of ground-water samples taken on June 7, 1996 at the solid waste transfer station, West Yellowstone, Montana.

Fall	bkgd						
	11/2/95	HHS	K	C	F	I	
cis-1,2-dichloroethene (µg/l)	70	ND	3.00	12.00	0.49		
tetrachloroethene (µg/l)	5	ND	ND	0.34	0.22		
vinyl chloride (µg/l)	2	ND	ND	0.17	ND		
sulfate (mg/l)	N/A	2	38	7	9		
chloride (mg/l)	N/A	<1	9	2	3		
SC (µmhos/cm)	N/A	73	390	150	114		
nitrate (mg/l)	10	0.08	0.1	0.18	0.18		
iron (mg/l)	0.3	<0.03	9.19	1.12	<0.03		
manganese (mg/l)	.05	<0.01	4.85	7.75	0.01		
zinc (mg/l)	5	0.03	0.08	0.03	0.02		
pH	N/A	6.9	6.7	6.6	6.7		
Spring	6/7/96	HHS	K	C	F	I	(E)
							bkgd
cis-1,2-dichloroethene	70	ND	2.9	21	0.55	ND	
tetrachloroethene	5	ND	ND	0.21	0.13	ND	
vinyl chloride	2	ND	ND	ND	ND	ND	
benzene	5	ND	0.25	ND	ND	ND	
1,4-dichlorobenzene	75	ND	0.35	0.22	ND	ND	
sulfate	N/A	ND	18	13	10		
chloride	N/A	ND	7	4	3		
SC	N/A	53	485	159	109	50	
nitrate	10	0.06	0.58	0.13	0.19		
iron	0.3	<0.03	14.9	2.62	0.04		
manganese	0.05	<0.01	7.81	8.76	0.01		
zinc	0.05	0.04	0.08	0.05	0.24		
pH	N/A	6.8	6.4	6.2	6.4	7.0	

Adams

2720 (1950)

DECISION MEMO

**SPECIAL USE PERMIT - WASTE TRANSFER SITE/CLOSED LAND FILL
WEST YELLOWSTONE/HEBGEN BASIN SOLID WASTE DISTRICT**

USDA - Forest Service
Hebgen Lake Ranger District
Gallatin National Forest
Gallatin County, Montana

PROPOSED ACTION

The West Yellowstone/Hebgen Basin Solid Waste District (WY/HBSWD) of West Yellowstone, Montana, has applied for a special use permit for the purpose of continuing the operation of a solid waste transfer facility and maintaining a closed landfill. This facility is used year-round. The Gallatin National Forest proposes to reissue this permit for continued use of the area which has been authorized since 1971. No change in use is planned. The previous permit terminated on December 31, 1993, and the new authorization would expire on **December 31, 2004**.

The area requested for authorization is approximately four (4) miles north of the town of West Yellowstone, in Section 3, T13S, R5E, P.M., Gallatin County, Montana. The entire permit area would total **12.64 acres**, to be occupied and used as follows:

- Active Waste Transfer Site and Associated Facilities	5.67 acres
- Closed Landfill Site	6.36 acres
- Access Road	0.61 acres
- Nine (9) Ground Water Monitoring Wells	(included)
TOTAL	12.64 acres

DECISION

Under authority of the Organic Administration Act of June 4, 1897, (30 Stat. 11, as amended; 16 U.S.C. 473-475, 477-482, 551; 6/4/87), it is my decision to issue a special use permit to the West Yellowstone/Hebgen Basin Solid Waste District for the purpose of continuing operation of an active solid waste transfer facility and maintenance of a closed landfill. Under this authorization, WY/HBSWD will be responsible for the transfer facility (5.67 acres), the closed landfill (6.36 acres), the access road (0.61 acres), and the nine (9) ground water monitoring wells, for a total of **12.64 acres**.

In making this decision, I considered the following:

- The facility provides a much needed public service for the growing Hebgen Basin community.
- No private land is available to provide this service.
- This decision would authorize continued use of a site which has been used for waste disposal and transfer since 1971. The existing transfer facilities have been in place since 1984, and landfill closure was accepted by the State in 1989.
- The area to be authorized exceeds five (5) acres, the area specified under FSH 1909.15, Section 31.2 - 3, criteria for exclusion from review in an environmental assessment or environmental impact statement. The original landfill area occupied ten (10) acres, which is completely fenced. Current activity occurs on fewer than five (5) acres within the fence. The scale, scale-house, and restroom facility are located outside the fence. The transfer facility, within and outside the fence, is 5.67 acres. The access road occupies an additional 0.61 acres. Activity occurs on a total of about 6.28 acres. However, activities are intermittent and would not impact over 5 acres of land at any one time.
- Continued use of the transfer facility, access road, and monitoring wells to ensure the integrity of the closed landfill will not likely adversely affect wetlands and floodplains; threatened, endangered, sensitive or proposed species or their habitat; nor scientific, cultural, or historic values.

2720 (1950)

DECISION MEMO

WY/HBSWD

Page 2

This decision is contingent upon the following requirements:

- The site will be used *only* for the transfer of solid waste. No new garbage will be buried at the site.
- In accordance with recommendations from the Montana Department of Health and Environmental Sciences (MDHES) and as a permit condition, WY/HBSWD will be required to monitor ground water for volatile organic compounds, as provided in the Administrative Rules of Montana 16.14.706, Table 1, and as described under **BACKGROUND**, which follows.

BACKGROUND

WY/HBSWD is an entity of Gallatin County government, operated by a board of directors. The board meets monthly and is responsible for operation of the facility and compliance with the terms of the special use authorization. In addition, the board sets fees, issues bills to residents, and negotiates with the waste management contractor.

The site was used as an open landfill from 1971-1988. In 1984, transfer facilities including a scale, scale-house, enclosed transfer building, and roll-off container platform were built. At that time, Class II garbage consisting of normal household waste was no longer disposed of on the site, but was transferred to an approved landfill in Logan, Montana. Class III garbage consisting of furniture, building materials, and other nontoxic debris was accepted at the West Yellowstone site until 1988 when the open landfill was permanently closed and capped. **Burying refuse is no longer permitted at this site.**

Since 1988, the site has been used only as a transfer facility. Garbage is hauled to the site by a local waste management contractor and by local citizens. When transfer containers are full, the garbage is hauled by the contractor to the landfill in Logan, Montana. Waste management contract agreements exist between the holder and the contractor, and the Forest Service is not a party to these agreements or contracts.

Future use of the site is expected to continue, as it has since 1988, as a waste transfer facility. Refuse will be hauled to a certified landfill for disposal.

The Madison River, a nationally recognized blue-ribbon trout stream, flows westerly out of Yellowstone National Park approximately 1/2 mile south of the landfill and waste transfer facility. Concern over potential ground water contamination led to the drilling of nine water monitoring test wells in August 1977, and subsequent closure of the landfill in the 1980s. One of the wells is within the boundary of Yellowstone National Park. In 1992, an additional well was drilled north of the transfer area to provide running water for a restroom facility used by the scale-house attendant. no supply

As part of the landfill closure plan drafted by MDHES, the WY/HBSWD was required to perform annual ground water sampling for at least three years after the landfill area was closed (MDHES letter dated 5/5/88). Testing was performed intermittently from 1988-93. Sampling for such compounds as chloride, sulfate, iron, manganese, and zinc, revealed reduced levels of these compounds, and therefore improved ground water quality following dump closure.

Forest Service environmental engineering specialists concluded the test results and statutory requirements do not warrant requiring WY/HBSWD to install any additional wells. The specialists also determined that no further monitoring is warranted for hazardous materials (HAZMAT) because the West Yellowstone/Hebgen Basin community is not: 1) a large population center; 2) a major industrial or manufacturing center; or 3) an agriculture center with high use of pesticides, fertilizers, or other agricultural chemicals.

The Forest Service also consulted with MDHES to determine if the State would require continued ground water monitoring. Based on available ground water monitoring data, MDHES determined there was not enough information to support clean-up recommendations or declaring the area a Superfund site.

The MDHES closure plan also requires that "some indicator organic parameters be monitored as well, such as pesticide residues, solvents, fuels or other appropriate indices of land fill contamination." These items are classed as Volatile Organic Compounds (VOCs). MDHES concluded that previous analyses did not include testing for VOCs, which are pollutants that would not occur naturally in a ground water system. VOCs would only be present in ground water if they were introduced by some unnatural influence, such as leakage from buried waste. Gasoline and oil, refrigerator gases, and other types of industrial waste items could be contributors to VOC pollution.

2720 (1950)

DECISION MEMO

WY/HBSWD

Page 3

*Is the cost
what about applying well.*

Because testing for VOCs has not been done since the landfill was closed, MDHES recommends a minimum of three wells (wells C, F, and I) be tested for VOCs as provided in the Administrative Rules of Montana (ARM) 16.14.706, Table 1. If water sample analysis from these wells shows the presence of VOCs, a monitoring schedule would then be established, and MDHES would recommend corrective actions that WY/HBSWD should take. VOC analysis would resolve any concerns that leachate from the closed landfill may be contaminating the ground water system, and would ensure the natural water quality of the nearby Madison River. *

SCOPING AND PUBLIC INVOLVEMENT

The Forest Service has published notice of the proposed project twice (April-June 1994 and July-September 1994) in the quarterly NEPA project listing.

The Forest Service also consulted with MDHES, and through this process, developed the necessary ground water monitoring requirements for the permit.

CATEGORICAL EXCLUSION

The proposed action may be categorically excluded from documentation in an environmental assessment (EA) or environmental impact statement (EIS) under FSH 1909.15, Section 31.2 - 3, 'Approval, modification, or continuation of minor special uses of National Forest System lands that require less than five contiguous acres of land.'

FINDINGS OF CONSISTENCY AND SIGNIFICANCE

The proposed action is consistent with management direction in the Land Management Plan for the Gallatin National Forest, (Forest Plan Objectives-Chapter II, p. 27, 12.c. items 1-4; pp. III-40-43; Appendix G, pp. G-3, G-30-34 VIII.). The proposal is also consistent with the Organic Administration Act (30 Stat. 11, as amended; 16 U.S.C. 473-475, 477-482, 551; 6/4/87).

The following findings indicate that no extraordinary circumstances exist which might cause the proposed action to have significant effects:

1. No significant beneficial or adverse impacts are likely to result from the proposed action.
2. The proposed action will benefit public health and safety. The proposal provides a convenient, controlled location for the local community to dispose of household and industrial garbage. This facility negates the need to develop another, perhaps less desirable, waste treatment site.
3. The site is adjacent to the west boundary of Yellowstone National Park, approximately 1/2 mile north of the Madison River, and about four (4) miles north of the town of West Yellowstone.

The proposed action will not likely affect historic or cultural resources, park lands, prime farm lands, wetlands, wild and scenic rivers, or other ecologically critical areas.

As a condition of the proposed action, the holder will be responsible to monitor ground water for specific potential contamination (VOCs).

4. Effects of the proposed action on the quality of the human environment are not likely to be highly controversial. The facility is well maintained and completely fenced-in. There are no residences or recreation areas within sight distance of the facility, and it is not visible from Highway 191, the main access point.
5. The expected effects of the transfer facility and closed landfill are minor, and do not involve highly uncertain, unique or unknown risks because of detailed planning and analysis by the Forest Service and MDHES, and proper management by WY/HBSWD.

2720 (1950)

DECISION MEMO

WY/HBSWD

Page 4

6. The proposed action will not set a precedent for future actions with possible significant effects. Each individual special use request must be analyzed and evaluated on its own merit, and decisions to issue or renew authorizations will be made on a case-by-case basis.
7. This proposed action is not related to other actions with individually significant but cummulatively significant actions.
8. The Forest Archeologist examined the site and found no items of cultural resource significance or concern. The proposed action will not cause loss or destruction of significant scientific, cultural or historical resources.
9. The proposed action is within occupied grizzly bear habitat categorized as Management Situation II (MS-II), (Gallatin National Forest Plan, p. G-3, 9/87). The grizzly bear is classified as a threatened species under the Endangered Species Act (ESA, P.L. 93-205, 12/29/73). MS-II areas lack distinct grizzly population centers, but may be used occasionally by grizzlies, and may contain habitat suitable for grizzly bear survival and recovery.

The entire landfill and transfer site facility is enclosed by an eight (8) foot high chain link fence with barbed wire strands on top of it. There is no exposed garbage to serve as an attractant to bears. The special use permit will contain a Grizzly Bear Management and Protection Plan.

The Madison River is about 1/2 mile south of the waste transfer facility. Bald eagles, classified as endangered under ESA, forage along the river. However, the project area is not within any known eagle nesting area.

The District Wildlife biologist was consulted regarding the proposed permit renewal, and had no concerns regarding threatened, endangered, or sensitive wildlife species or their habitat.

10. The proposed action will not violate nor threaten to violate any federal, state, or local law or requirement imposed for the protection of the environment.

ADMINISTRATIVE REVIEW OR APPEAL OPPORTUNITIES

Pursuant to 36 CFR 215.8(a)(4), this decision is not subject to administrative review or appeal.

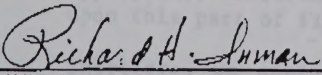
IMPLEMENTATION

This decision may be implemented immediately.

CONTACT PERSON

The case file including the environmental analysis for this project is available for review at the Gallatin National Forest Supervisor's Office and at the Hebgen Lake Ranger District. For further information regarding the proposed action or this decision, please contact:

Patricia C. Hesch
Hebgen Lake Ranger District
P.O. Box 520
West Yellowstone, MT 59758
Phone (406) 646-7369
FAX (406) 646-9632


DAVID P. GARBER
Forest Supervisor

6/20/94
DATE

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL

of pages 7

To: <i>Pat Potts</i>	From: <i>Pat Hesch</i>
Dept./Agency: <i>6</i>	Phone #: <i>646-7369</i>
Fax #: <i>449-499</i>	Fax #:

NSN 7540-01-317-7368

5099-101

GENERAL SERVICES ADMINISTRATION

DEPARTMENT OF HEALTH AND



TED SCHWINDEN, GOVERNOR

STATE OF MONTANA

Solid & Hazardous Waste Bureau
 Telephone: (406) 444-2821

HELENA, MONTANA 59620

May 5, 1988

Larry Wanner, Chairman
 West Yellowstone - Hebgen Basin Solid Waste District
 P.O. Box 239
 West Yellowstone, Montana 59758

Dear Larry:

We have received a set of closure plans from Damschen & Associates for the reclamation of the Class III landfill site at West Yellowstone. As we discussed at the last meeting I was able to attend, cessation of landfill activities at the site and proper closure should dramatically lessen the groundwater contamination problem evident at the site.

As you are aware, the Department has seriously considered the merits of requiring a synthetic "liner" or cap over the finished landfill to positively seal out infiltration of moisture into the buried waste. Due to the fact that the site already has a leachate plume from the landfill and there is no soil available to provide anything other than a sand cap, we feel that a synthetic cap would be justified in order to stop the groundwater contamination which has been documented and the probable release of leachate into the Madison River. However, we also appreciate the fact that the estimates of the cap, labor, engineering, etc., are in the \$100,000 to \$125,000 range and that would be difficult for a small district to raise.

For these reasons the department has made the decision to defer the requirement for such a liner pending receipt of additional information regarding the current plume and the effect of closure of the landfill with only a soil cap.

You are advised, however, that an adequate cap, including a liner, if necessary, may be required at any time. If the next sample shows contamination levels have increased, for example, we reserve the right to order the district to undertake appropriate remedial measures at any time. Additionally, if the sand cap does not do an adequate job of decreasing contamination levels, we would expect to require that capping or other appropriate measures be instituted immediately. We would expect a decision upon this part of final closure within a three year period.

Therefore, we approve the final closure plan submitted for the landfill with the following conditions:

COPY I

1) The district shall arrange for a final inspection of the completed closure activity, and written certification of adherence to the plan shall be submitted to the department.

2) The groundwater sampling plan will be modified as follows:

a) Annual groundwater quality sampling will be conducted for at least the next three (3) years.

b) Well logs for the existing sampling wells must be submitted to this department.

c) The district shall retain the services of a qualified consultant to address the current vertical and horizontal extent of the contamination plume from the landfill. At least one "downstream" sample will be taken from a well from a point deep enough in the aquifer to determine if the area of greatest concentration of the plume has been detected and is being adequately monitored. In addition to the inorganic parameters being currently sampled, we will require that some "indicator" organic parameters be monitored as well; such as pesticide residues, solvents, fuels or other appropriate indices of landfill contamination. Selection of appropriate parameters will be the responsibility of your consultant with approval of the department a requirement prior to sampling.

3) If groundwater sampling shows that the plume has reached the Madison River, the district will arrange to have "upstream" and "downstream" sampling done in the river in order to determine the impact, if any, on surface water resources.

4) The district may want to consider stockpiling a quantity of soil adequate to provide cover over a synthetic liner if such a liner is required. According to my discussion with Barry Damschen, this would involve approximately one third of the available material from the town.

5) As an alternative to the prospect of a liner for the landfill, I would recommend that the district investigate the possibility of preparing a comprehensive plan for revegetating the cover at the site, including addition of organic soil amendments as necessary to insure adequate survival of a non-irrigated cover crop. Even though this would involve some expense, it might save some of the cost of a liner and have longer lasting effects. I'm quite sure the Forest Service would have the expertise to assist with a plan such as this. Again, the department will have to approve such a plan and still reserves the right to require any other appropriate closure measures.

5) Before the prospect of adequate capping is abandoned at this time, we request that the Soil Conservation Service be contacted to find out if there are any areas nearby from which it might be possible to obtain clay capping soils. I understand from talking to Emery Nelson that there may be less permeable materials available at the north end of the "basin" near the cemetery. Whether or not these would be available for use is unknown. We request that the district contact the S.C.S., find out whether such soils exist and advise us whether any are available. Even some addition of tighter soils to the sand cap could greatly increase it's effectiveness.

Fill in box with

Per - the plan is to use the river as a deep

One final matter still needs to be resolved, and that concerns the maintenance of a "concrete fill" area at the site. Since maintenance of any kind of landfilling activity at the site must be approved by the department, we request that you submit a plan of operation for the "concrete fill" area, including details of the following:

- 1) How the area will be supervised to insure that only inert wastes such as concrete will be disposed of at the site, and;
- 2) How much of this waste the district will accept and what physical limits of the fill area will be, and;
- 3) Since periodic and final cover will be necessary over this waste, where this cover will be obtained, and how the area will be finally reclaimed.

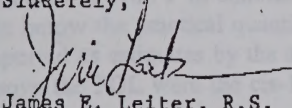
Frankly, the Department is strongly opposed to any continuation of landfilling at the site for several reasons, principally the experience we have seen with inadequate supervision of wastes at the existing landfill, and the fact that there will no longer be appropriate cover materials available for continued landfilling. Unless and until the district comes up with an approvable plan to address these items, we will not approve continuation of landfilling at the site in any fashion once closure is completed.

* We would appreciate your written confirmation of the requirements set forth in this letter.

Under separate cover, I have sent a letter modifying your transfer station license to include the new forty yard container site.

If you have any questions, or we may be of additional service, please contact us.

Sincerely,


James E. Leiter, R.S.

cc: Edward King, M.D., Health Officer
Emery Nelson, R.S.
Board of County Commissioners, Gallatin County
Forest Supervisor, U.S.F.S., Gallatin National Forest, Box 130,
Bozeman, MT 59715
Ralph Maier, U.S.F.S., District Office, West Yellowstone, MT 59758



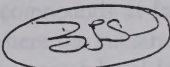
DAMSCHE & ASSOCIATES, INC.
CONSULTING ENGINEERS

2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604

TELEPHONE (406) 449-8627
FAX (406) 449-8631

MEMORANDUM

To: West Yellowstone/Hebgen Basin Solid Waste District
Pat Hesch, US Forest Service

From: Bruce Siegmund, Project Hydrogeologist 

Date: July 30, 1996

Subject: Spring, 1996 transfer station ground-water monitoring

We recently received the results of the latest round of sampling at the West Yellowstone solid waste transfer station. There have been some changes since the previous sampling event, but the significance of these changes is not clear.

Perhaps the most significant finding from the laboratory reports is that there were no volatile organic compounds (VOCs) detected in either background wells. This practically eliminates the possibility that the VOCs found to date emanate from degrading well casings.

Of the three VOCs reported in the Fall, 1995 results, one, vinyl chloride, did not appear in any of the samples from this June. However, two previously undetected compound appeared in the most recent results. Benzene was detected in the sample from Well C at a concentration of 0.25 micrograms per liter ($\mu\text{g/l}$), and benzene and 1,4-dichlorobenzene were detected in Well F in concentrations of 0.35 and 0.22 $\mu\text{g/l}$, respectively. All of these values are below the practical quantitation limit (PQL) of the laboratory instrumentation, and are reported as estimates by the analytical laboratory. The only two analyses that were reported above the PQL were the cis-1,2-dichloroethane from Wells C and F at 2.9 and 21 $\mu\text{g/l}$, respectively.

The values reported for metals, sulfate and nitrate were generally higher than those reported from the previous sampling. pH values were lower overall, even in background Well K, and specific conductance (SC) was also lower across the facility.

It is important to note that none of the VOCs detected at the facility exceed any Human Health Standards (HHS) as delineated in WQB-7, which is the State guideline for water standards. Some of the metals are in exceedance of these guidelines, but the source of the metals is much more difficult to discern in contrast to man-made compounds.

The interpretation we make of these data initially is that a fairly weak plume of leachate is

emanating from the base of the landfill and migrating in a southerly direction. The strongest evidence for this is the generally decreasing concentration of contaminants down-gradient from the landfill and the abrupt increase over background of several parameters, especially specific conductance. In many landfills, low quantities of VOCs are associated with the migration of landfill gas away from the waste mass toward the ground water due to the capping of a facility. In such instances, small concentrations of chlorinated hydrocarbons and fluoro-chlorocarbons are introduced to the upper portion of a given aquifer. This appears not to be the case with the West Yellowstone transfer station. First, the facility was closed so long ago that there should be no methane being produced. Second, the suite of VOCs detected to date do not match the commonly-observed compounds at facilities where landfill gas is being produced. Last, at a facility such as this, where the substrate is extremely permeable, one would expect the VOCs to be observed at some level in the background wells because the landfill gas does not migrate strictly in conjunction with ground-water flow.

With your approval, we will submit these results to the Montana Department of Environmental Quality. If you have any questions or require any additional information, please do not hesitate to contact us.

pH	N/A	6.2	6.7	6.6	6.7	
ATP	N/A	2	2	7	1	2
o-x-1,2-dichlorobenzene	70	ND	2.2	21	0.03	ND
m-x-dichlorobenzene	5	ND	ND	0.21	0.13	ND
p-x-dichlorobenzene	2	ND	ND	ND	ND	ND
toluene	5	ND	0.25	ND	ND	ND
1,4-dichlorobenzene	70	ND	0.30	0.22	ND	ND
o-xylene	N/A	ND	18	13	70	
chloride	N/A	ND	7	4	2	
SO ₄	N/A	23	485	159	108	50
nitrate	10	0.06	0.38	0.13	0.19	
iron	0.3	<0.01	14.9	2.67	0.04	
calcium	0.05	<0.01	7.81	3.76	0.01	
silica	0.05	0.04	0.69	0.22	0.24	
pH	N/A	6.2	6.4	6.3	6.2	7.0

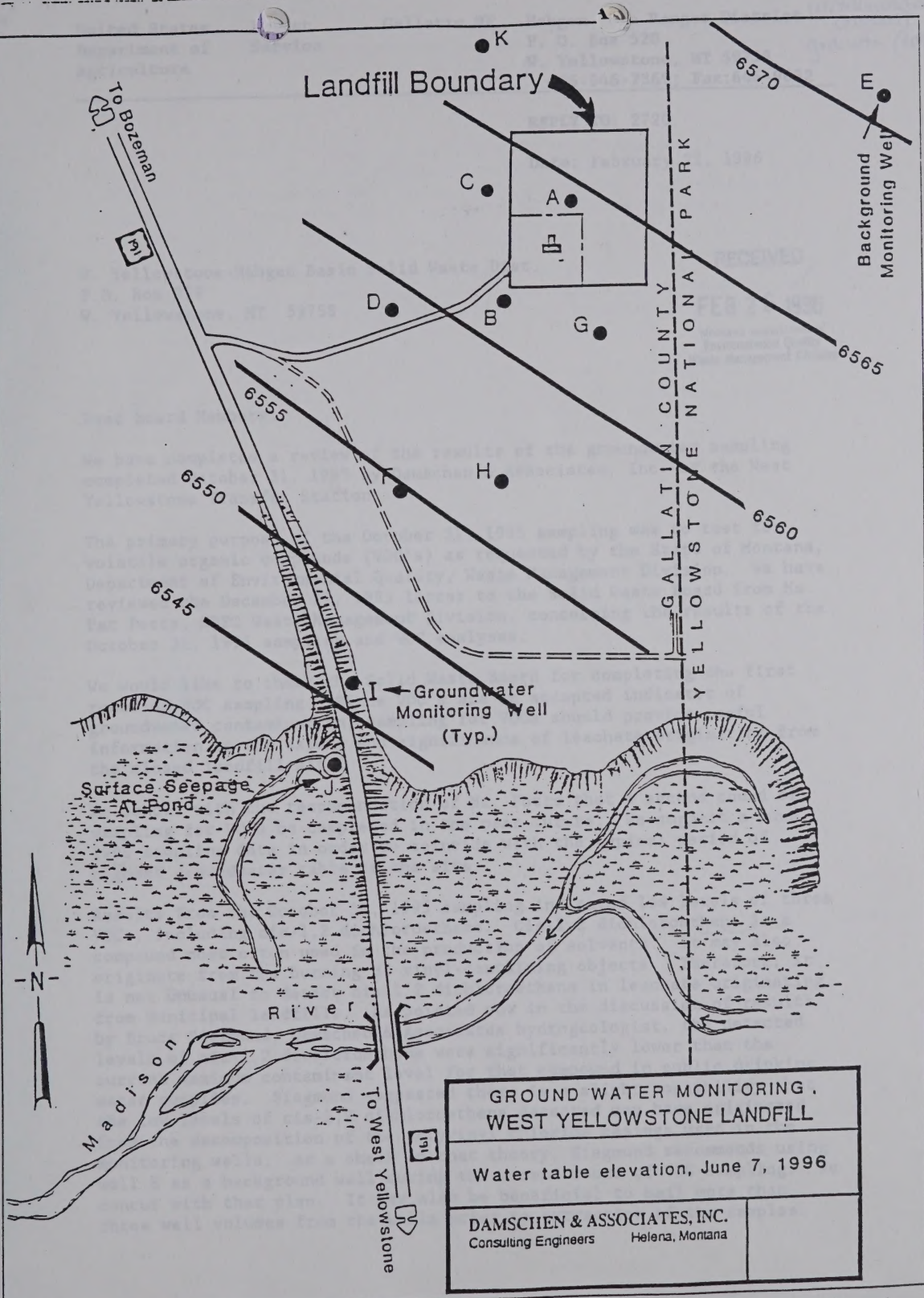
Table of selected analytical results of ground-water samples taken on June 7, 1996 at the solid waste transfer station, West Yellowstone, Montana.

11/2/95	HHS	K	C	F	I	
cis-1,2-dichloroethene ($\mu\text{g/l}$)	70	ND	3.00	12.00	0.49	
tetrachloroethene ($\mu\text{g/l}$)	5	ND	ND	0.34	0.22	
vinyl chloride ($\mu\text{g/l}$)	2	ND	ND	0.17	ND	
sulfate (mg/l)	N/A	2	38	7	9	
chloride (mg/l)	N/A	<1	9	2	3	
SC ($\mu\text{mhos/cm}$)	N/A	73	390	150	114	
nitrate (mg/l)	10	0.08	0.1	0.18	0.18	
iron (mg/l)	0.3	<0.03	9.19	1.12	<0.03	
manganese (mg/l)	.05	<0.01	4.85	7.75	0.01	
zinc (mg/l)	5	0.03	0.08	0.03	0.02	
pH	N/A	6.9	6.7	6.6	6.7	
6/7/96	HHS	K	C	F	I	E
cis-1,2-dichloroethene	70	ND	2.9	21	0.55	ND
tetrachloroethene	5	ND	ND	0.21	0.13	ND
vinyl chloride	2	ND	ND	ND	ND	ND
benzene	5	ND	0.25	ND	ND	ND
1,4-dichlorobenzene	75	ND	0.35	0.22	ND	ND
sulfate	N/A	ND	18	13	10	
chloride	N/A	ND	7	4	3	
SC	N/A	53	485	159	109	50
nitrate	10	0.06	0.58	0.13	0.19	
iron	0.3	<0.03	14.9	2.62	0.04	
manganese	0.05	<0.01	7.81	8.76	0.01	
zinc	0.05	0.04	0.08	0.05	0.24	
pH	N/A	6.8	6.4	6.2	6.4	7.0

GROUND WATER MONITORING
WEST YELLOWSTONE LANDFILL

Water table elevation, June 7, 1996

WILKINSON & SONS, INC.
Consulting Engineers



Landfill Boundary

GALLATIN COUNTY NATIONAL PARK
YELLOWSTONE

Background Monitoring Well

Groundwater Monitoring Well (Typ.)

Surface Seepage At Pond

Madison River

GROUND WATER MONITORING .
WEST YELLOWSTONE LANDFILL

Water table elevation, June 7, 1996

DAMSCHEN & ASSOCIATES, INC.
Consulting Engineers Helena, Montana

United States
Department of
Agriculture

Post
Service

Gallatin NF

Hebgen Ranger District
P. O. Box 520
W. Yellowstone, MT 59758
406-646-7369; Fax: 646-9632

File: GALLATIN
W. Yellowstone
(closed)
grad wtr (c)

REPLY TO: 2720

Date: February 22, 1996

W. Yellowstone-Hebgen Basin Solid Waste Dist.
P.O. Box 239
W. Yellowstone, MT 59758

RECEIVED

FEB 26 1996

Montana Department of
Environmental Quality
Waste Management Division

Dear Board Members:

We have completed a review of the results of the groundwater sampling completed October 31, 1995 by Damschen & Associates, Inc. at the West Yellowstone Transfer Station.

The primary purpose of the October 31, 1995 sampling was to test for volatile organic compounds (VOC's) as requested by the State of Montana, Department of Environmental Quality, Waste Management Division. We have reviewed the December 29, 1995 letter to the Solid Waste Board from Ms. Pat Potts, MDEQ Waste Management Division, concerning the results of the October 31, 1995 sampling and VOC analyses.

We would like to thank the Solid Waste Board for completing the first round of VOC sampling. Since VOC's are an accepted indicator of groundwater contamination, sampling for VOCs should provide useful information on the extent and significance of leachate originating from the closed landfill site.

We concur with the recommendation of Ms. Potts that a second round of sampling for VOCs be completed in the near future. We suggest a June, 1996 sampling date in order to coincide with the typical period of highest groundwater table at the site.

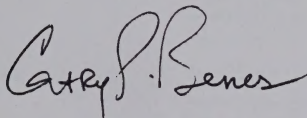
Results from the October 31, 1995 sampling indicated low levels of three VOCs, including cis-1,2 dichloroethene. Cis-1,2 dichloroethene is a compound most often used in the production of solvents. It may also originate from the burning of vinyl-containing objects. Therefore, it is not unusual to detect cis-1,2 dichloroethene in leachate originating from municipal landfills. As pointed out in the discussion of results by Bruce Siegmund, Damschen & Associates hydrogeologist, the detected levels of cis-1,2 dichloroethene were significantly lower than the current maximum contaminant level for that compound in public drinking water supplies. Siegmund suggested there is a slight possibility that the low levels of cis-1,2 dichloroethene detected may have originated from the decomposition of the polyvinyl chloride casings used in the monitoring wells. As a check on that theory, Siegmund recommends using well E as a background well during the second round of VOC sampling. We concur with that plan. It may also be beneficial to bail more than three well volumes from the wells prior to extraction of the samples.

As pointed out by Bruce Siegmund, it appears that laboratory procedures may have resulted in false positives for acetone and MEK. If the apparent laboratory contamination is discussed with the laboratory, it should be possible to eliminate this problem during the second sampling event.

The second round of VOC sampling is necessary to eliminate the concern over the possible influence of the PVC well casings, eliminate the false positives for acetone and MEK, and provide additional confirmation of the presence or absence of VOC's in the groundwater downgradient from the closed landfill.

I am enclosing a paper which provides information on 1,2,-dichloroethene. I encourage you to take some time to read the information to familiarize yourselves with this compound and its effects on the human environment.

Please arrange to have the second round of VOC sampling completed during the month of June, 1996. When the sampling date has been set, please provide prior notification to Patricia Hesch of this office (406-646-7369). Your continuing cooperation in this matter is appreciated.



GARY L. BENES
District Ranger

(Stan)

cc: SO-Lands
SO-Engineering (F.Ehernberger, T.Keyes)
Damschen & Associates
MDEQ (P.Potts)

Tom Keyes

SOLID WASTE PROGRAM ROUTE SLIP☐ **NEW APPLICATION**

Initial / Date

Jim W.
 Jon D.
 Proof
 Cathy
 Roger

☐ **NEW LICENSE**

Initial / Date

Jim W.
 Jon D.
 Proof
 Carol
 Cathy
 Roger

☐ **HEALTH OFFICER CARD**

Initial / Date

Jim W.
 Carol
 Cathy

☐ **INSPECTIONS**

Initial / Date

Pat C.
 Jon D.
 Proof
 Carol
 Roger

☐ **INTERIM CLOSURES**

Initial / Date

Jim W.
 Jon D.
 Proof
 Carol
 Cathy
 Roger

☐ **CLOSURES**

Initial / Date

Jim W.
 Jon D.
 Proof
 Carol
 Cathy
 Roger

☐ **CHANGE IN LICENSE
FOR FEE STATUS**

Initial / Date

Jim W.
 Jon D.
 Proof
 Cathy
 Roger

☐ **COMPLAINTS**

Initial / Date

Pat C.
 Jon D.
 Proof
 Roger
 Carol (filing & DBase)

☒ **GENERAL CORRESPONDENCE**

Initial / Date

Pat C./Jim W.
 Jon D.
 Proof
 Roger

☒ **MISCELLANEOUS**

Initial / Date

Proof
Pat C
Jim W
Roger T

GRD WTR
CU 12-28
FEL 12-28
12-28
ps

sw/gallwyl.095

DEPARTMENT OF
ENVIRONMENTAL QUALITY

Waste Management Division
Solid Waste Program
406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE LOCATION: 2209 PHOENIX AVE.
HELENA, MONTANA

MAILING ADDRESS: PO BOX 200901
HELENA, MT 59620-0901

December 29, 1995

Phil Olson
Gallatin County Commissioners
311 West Main, Room 301
Bozeman, Montana 59715

RE: WEST YELLOWSTONE CLASS II LANDFILL (CLOSED), GALLATIN COUNTY
LICENSE NO. 237
REVIEW OF OCTOBER 1995 GROUND WATER MONITORING RESULTS

Dear Mr. Olson:

On December 8, 1995 the Department received a copy of the ground water analytical results from the sampling event conducted on October 31, 1995 at the West Yellowstone (closed) Landfill. These results revealed detectable levels of several common landfill-related volatile organic compounds (VOCs). As mentioned in the cover letter from Damschen and Associates, that accompanied these results, it could be possible that degradation of the PVC well casings and screens may be occurring in the older monitoring wells.

Damschen has suggested sampling an older upgradient monitoring well (E) for VOCs instead of the more recently installed supply well for the transfer station (well K). This might be helpful in determining if degradation of the monitoring well-PVC is occurring in the older wells, or if the source of the VOCs detected in the ground water is associated with the old landfill. The Department encourages Gallatin County to consider acting on this suggestion.

Another option that may more definitely identify and more accurately quantify the source of the VOC contamination that was detected in the ground water, would be to drill one or more additional downgradient monitoring wells at this site. Initially, a new monitoring well(s) should be located in the vicinity of existing downgradient monitoring well F, where the higher concentration levels of VOC contaminants were detected.

At this time it is also important to note that there was apparently a cross contamination problem and/or an introduction of contaminants that affected the analytical results in the samples collected from monitoring well C and in the trip blank. Monitoring well C should

December 29, 1995

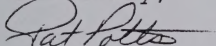
be re-sampled to determine if any VOCs are actually impacting this well from the old landfill activities.

Although the West Yellowstone Landfill was closed in 1988, it is important to point out that ground water monitoring was required at this facility during the active and the closure periods. The original site-specific ground water monitoring requirement was based on the permeable nature of the subsurface and the relatively shallow depth to ground water in this area. More recently (June 20, 1994), the Forest Service issued a " Decision Memo - Special Use Permit" for the continued operation of the transfer station located on Forest Service land. One of the contingencies of this decision was that the Gallatin County Refuse District sample the ground water and analyze these samples specifically for VOCs in the area of the old landfill.

The Department strongly encourages the Gallatin County Refuse Board and the Forest Service to work together to more fully determine the nature and extent of the VOC contamination detected at the old West Yellowstone Landfill. The Department recommends that confirmation of the VOCs detected in the downgradient monitoring wells at this facility should be done as soon as possible, either by conducting additional sampling and re-sampling, and/or by drilling a new monitoring well(s).

If the Department can be of any further assistance, please give me a call.

Sincerely,



Pat Potts
Environmental Specialist

cc: Gary L. Benes, District Manager, Hebgen Lake Ranger District, P.O. Box 520,
West Yellowstone, MT 59758

Patricia Hesch, Hebgen Lake Ranger District, P.O. Box 520, West Yellowstone,
MT 59758

Jacquelyn F. Stonnell, RN, MPH, Gallatin County Health Officer, 311 W. Main,
Room 4, Bozeman, MT 59715

Carol Fox - CECRA Program

John Arrigo - Water Quality Division

path: sw\gallwyel.o95

file: Gallatin Co/W. Yellowstone/grd wtr (corr)



DAMSCHEN & ASSOCIATES, INC.
CONSULTING ENGINEERS

2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604

TELEPHONE (406) 449-8627
FAX (406) 449-8631

RECEIVED

OCT 23 1995

Montana Department of
Environmental Quality
Waste Management Division

October 19, 1995

Pat Potts
Dept. Of Environmental Quality
Waste Management Division
P.O. Box 200901
Helena, MT 59620-0901

Dear Pat:

On October 18, 1995 I met with the West Yellowstone/Hebgen Basin Solid Waste District concerning the sampling of the wells at the closed landfill. After a long discussion, the Board retained our firm to conduct two (2) rounds of sampling (this Fall and next Spring). I would appreciate it if you could review the enclosed proposal and get back to me or Bruce within the next 7 days to make sure we are all in agreement on what the sampling and testing plan should be.

We look forward to hearing from you.

Very truly yours,

DAMSCHEN & ASSOCIATES, INC.

Barry E. Damschen, P.E.
Project Manager

Enclosure

cc: Pat Hesch - Gallatin National Forest
Larry Wanner, District Chairman

PAT - You may
consider our
Pitche Compensation
THIS AM. (10/20/95)
A SUFFICIENT RESPONSE
TO THIS -

THANKS

Bruce



DAMSCHEN & ASSOCIATES, INC.

CONSULTING ENGINEERS

2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604

TELEPHONE (406) 449-8627
FAX (406) 449-8631

October 19, 1995

West Yellowstone/Hebgen Basin Solid Waste District
P.O. Box 239
West Yellowstone, MT 59758

Dear Board Members:

As a follow-up to our meeting on October 18, 1995, I would like to reconfirm our agreement for our firm to provide testing of the wells at the landfill. Our scope of work will entail the following items for two rounds of sampling (the Fall and next Spring).

- 1) Travel to West Yellowstone and sample Wells C, F, I and the new supply well. (Include a trip blank also). Also measure the water levels in all of the wells at the site.
- 2) Send the samples to Energy Laboratories in Billings and have them analyze the samples for the Table 1 suite of volatile organic compounds (VOCs). These tests shall be performed on samples from Wells C, F, I, the new supply well (Well K) and the trip blank.
- 3) Obtain the results of the testing and prepare a brief report summarizing the results and groundwater flow direction. Submit the report to the District, State Department of Environmental Quality and Gallatin National Forest.
- 4) If any VOCs are detected, our scope of work and fees shall include meeting one time with the District's Board to discuss the results.

This work shall be conducted for the lump sum amount of \$5,000.00 (\$2,500.00 per event). This fee does not, however, include any work associated with meeting with the State DEQ, evaluating alternatives if any VOC's are detected or any additional groundwater monitoring or sampling that may be required if VOC's are detected. If the Board determines that this additional work is deemed appropriate or necessary, we will renegotiate the scope of work and fee prior to conducting any additional work.

We are planning to conduct the first sampling within the next 2-3 weeks. Therefore, if there are any parts of this proposal that are

United States
Department of
Agriculture

Pat
Service

Gallatin NF

La' (Cover)
Hedger Ranger District

P. O. Box 232

W. Yellowstone, MT 59755

406 338-7349; Fax 406-338-7332

not acceptable, please contact us within the next 10 days so we can make the proper changes. If we do not hear from you within the next 10 days, we will assume that this proposal is satisfactory and we will conduct the work.

SUBJECT: Transfer Station Water Monitoring

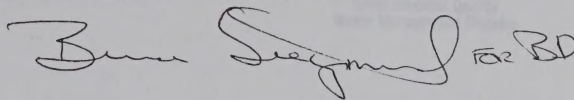
Very truly yours,

TO: W. Yellowstone/Hedger Basin Solid

DAMSCHEN & ASSOCIATES, INC.

P.O. Box 232

W. Yellowstone, MT 59755

 for BD

Barry E. Damschen, P.E.
President

cc: Pat Hesch, Gallatin National Forest
Pat Potts, Montana DEQ

In 1987, the Hedger Lake Hedger District began an environmental analysis to determine if there would be any significant environmental effects associated with the continued use of the current solid waste transfer site north of W. Yellowstone, and the subsequent removal of the special use permit authorizing the use of the site for such purpose. The only concern which came forth in the analysis process was that of ground water monitoring. In trying to determine if any continuous water monitoring was required under the closure rules in existence at the time the old land fill was closed, we found that a water monitoring requirement which was part of the closure plan was probably not met. In a letter dated May 5, 1988, from James Baker of the State of Montana Solid and Hazardous Waste Bureau, the following requirement was written:

"The District (Hedger Basin Solid Waste District), shall retain the services of a qualified consultant to address the current vertical and horizontal extent of the contamination plume from the landfill. At least one "downstream" sample will be taken from a well down a point deep enough in the aquifer to determine if the area of greatest concentration of the plume has been detected and is being adequately monitored. In addition to the periodic monitoring being currently needed, we will require that your "indicator" samples presently be enhanced as well, such as pesticide residues, asbestos, lead or other appropriate indices of landfill contamination. Selection of appropriate parameters will be the responsibility of your consultant with approval of the department a requirement prior to sampling."

Through discussion with Pat Potts of the State of Montana Department of Health and Environmental Sciences, and with Barry Damschen, of Damschen & Associates, Inc., we have determined that testing for volatile organic compounds (VOC's), was not completed. These compounds are the "indicator organics" mentioned in the above paragraph.

Through further discussion with Mr. Potts, and as written in a Decision News dated 10/1/88, supporting the former Supervisor's decision to renew the special use permit for the transfer station, a testing plan for the VOC's was recommended. The following paragraph is from that decision news:

United States
Department of
Agriculture

Forest
Service

Gallatin NF

*File: GALLATIN Co
West Yellowstone (inactive/closed)
grd (corr)*
Hebgen Lake Ranger District
P. O. Box 520
W. Yellowstone, MT 59758
406-646-7369; Fax: 646-9632

REPLY TO: 2720

Date: August 14, 1995

SUBJECT: Transfer Station Water Monitoring

RECEIVED

AUG 17 1995

Montana Department of
Environmental Quality
Waste Management Division

TO: W. Yellowstone/Hebgen Basin Solid Waste Board
P.O. Box 239
W. Yellowstone, MT 59758

Dear Board Members:

In 1993, the Hebgen Lake Ranger District began an environmental analysis to determine if there would be any significant environmental effects associated with the continued use of the current solid waste transfer site north of W. Yellowstone, and the subsequent renewal of the special use permit authorizing the use of the site for such purpose. The only concern which came forth in the analysis process was that of ground water monitoring. In trying to determine if any continued water monitoring was required under the closure rules in existence at the time the old land fill was closed, we found that a water monitoring requirement which was part of the closure plan was probably not met. In a letter dated May 5, 1988, from James Leiter of the State of Montana Solid and Hazardous Waste Bureau, the following requirement was written:

"The District (Hebgen Basin Solid Waste District), shall retain the services of a qualified consultant to address the current vertical and horizontal extent of the contamination plume from the landfill. At least one "downstream" sample will be taken from a well from a point deep enough in the aquifer to determine if the area of greatest concentration of the plume has been detected and is being adequately monitored. In addition to the inorganic parameters being currently sampled, we will require that some "indicator" organic parameters be monitored as well, such as pesticide residues, solvents, fuels or other appropriate indices of landfill contamination. Selection of appropriate parameters will be the responsibility of your consultant with approval of the department a requirement prior to sampling."

Through discussion with Pat Potts of the State of Montana Department of Health and Environmental Sciences, and with Barry Damschen, of Damschen & Associates, Inc., we have determined that testing for volatile organic compounds (VOC's), was not completed. These compounds are the "indicator organics" mentioned in the above paragraph.

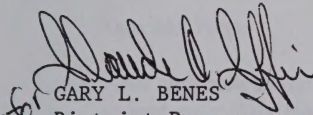
Through further discussion with Ms. Potts, and as written in a Decision Memo dated 6/20/94, documenting the Forest Supervisor's decision to renew the special use permit for the transfer station, a testing plan for the VOC's was recommended. The following paragraph is from that decision memo:

Because testing for VOC's has not been done since the landfill was closed, MDHES recommends a minimum of three wells (wells C, F & I) be tested for VOC's as provided in the Administrative Rules of Montana (ARM), 16.14.706, Table 1. If water sample analysis from these wells shows the presence of VOC's, a monitoring schedule would then be established, and MDHES would recommend corrective actions that WY/HBSWB should take. VOC analysis would resolve any concerns that leachate from the closed landfill may be contaminating the ground water system, and would ensure the natural water quality of the nearby Madison River.

Ms. Potts also suggested a spring and fall testing. In recent discussion about this subject with Mr. James Wilbur, of the State of Montana Department of Environmental Quality, he said the testings need not be in the same year; testing could be done this fall and next spring.

As a requirement of the special use authorization for the transfer station, I am asking that the testing recommendations of the State of Montana for volatile organic compounds be implemented as documented in the Forest Supervisor's Decision Memo of 6/20/94. Testing should begin in the fall of 1995.

Please keep Pat Hesch advised of your plans for resolving this matter. Your cooperation is appreciated.


GARY L. BENES
District Ranger

cc: SO-Lands
SO-Engineering (T.Keyes)
Damschen & Associates, Inc
State of Montana, Dept. of Env. Quality (Potts & Wilbur)



Blue Ridge Services • P.O. Box 4054 • Bozeman, MT 59772-4054

Telephone (406) 587-8771 • Fax (406) 587-8771

RECEIVED

JUL 03 1995

Montana Department of
Environmental Quality
Waste Management Division

June 29, 1995

Pat C. Potts
Montana Department of Health and Environmental Sciences
Solid and Hazardous Waste Bureau
2209 Phoenix Avenue
P.O. Box 200901
Helena, MT 59620-0901

RE: Ground water monitoring at the closed West Yellowstone landfill.

Dear Ms. Potts:

After our phone conversation this morning, I would like to reaffirm the status of the required monitoring of ground water at the closed landfill at West Yellowstone, MT. It was made clear that the ground water monitoring being requested to take place at the West Yellowstone/Hebgen Basin Solid Waste District Transfer station is at the behest of the United States Department of Agriculture - Forest Service, Hebgen Lake Ranger District, Gallatin National Forest. The Forest Service asked the Montana Department of Health and Environmental Sciences (MDHES) for recommendations on how to manage their concerns of ground water contamination. The MDHES gave a recommendation of performing two sampling events involving four wells. If no contamination is detected, then as far as the state is concerned the landfill should not require further monitoring.

It should be noted that even though the MDHES would not suggest more monitoring, the Forest Service has jurisdiction concerning requirements for the landfill, and may request additional monitoring.

Please review this and respond concerning the departments stance on this subject. If you wish to discuss this further, please feel free to contact me at (406) 587-8771. Thank you for your time, and I look forward to hearing from you soon.

Respectfully,

Troy Kechely
Blue Ridge Services

cc: West Yellowstone/Hebgen Basin Solid Waste District
Gallatin County Commissioners

FILE: GALLATIN Co
W. Yellowstone → Closed Ld711
grd wtr (corr)

ROUTE SLIP

DEPARTMENT OF HEALTH & ENVIRONMENTAL SCIENCES

TO:

Proof *MW*

DATE:

12/12/94

1.

Pat C. *PPC*

2.

Jon D. *JD*

3.

Roger T. *RC*



Approval



Comment



Necessary Action



Note and Return



Note and File



Investigate



Prepare reply



Signature



See Me



As requested



For your information



Per Conversation

REMARKS:

sw/gallwyl.mon

fax MR. Pruitt copy ASAP
4582-3003

FROM:

P³

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

Waste Management Division
Solid Waste Program
406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE 2209 PHOENIX AVE.
LOCATION: HELENA, MONTANA

MAILING PO BOX 200901
ADDRESS: HELENA, MT 59620-0901

December 12, 1994

A.D. Pruitt
Gallatin County Commissioners
311 West Main, Room 301
Bozeman, Montana 59715

RE: WEST YELLOWSTONE CLASS II LANDFILL (CLOSED), GALLATIN COUNTY
LICENSE NO. 237
GROUND WATER MONITORING

Dear Mr. Pruitt:

As we discussed in our meeting on December 8, 1994, state ground water monitoring requirements in 1988, when the West Yellowstone Landfill closed, were minimal to non-existent. However, site specific hydrogeologic conditions (e.g., high permeabilities, shallow ground water) at this site dictated an earlier need for special ground water monitoring requirements.

Evidence of a leachate plume was mentioned in a letter dated May 5, 1988, from the state to the West Yellowstone-Hebgen Basin Solid Waste District outlining critical conditions for the final landfill Closure Plan. Several of these conditions address monitoring the quality of the ground water for: basic inorganic parameters (ions and metals), as well as organic parameters such as, pesticide residues, solvents, fuels, and other appropriate indices of landfill contamination. Monitoring also included surface water, upstream and downstream in the Madison River.

Volatile organic compounds (VOCs) are generally common to landfilling activities through degradation of the wastes and the by-products associated with these processes, such as leachate generation and methane/explosive gases. In talking with the Forest Service over a year ago, the Department made several suggestions based on currently existing ground water monitoring regulations and knowledge of ground water monitoring at other solid waste disposal sites that might be beneficial to all parties involved in attempting to resolve the ground water monitoring requirements and issues.

West Yellowstone Landfill (closed)

Page 2

December 12, 1994

A summary of these requirements can be found in a "Decision Memo" dated June 20, 1994 from the USDA-Forest Service, Hebgen Lake Ranger District, Gallatin National Forest. These minimal requirements have been determined by the state Solid Waste Program to be adequate to determine if the ground water is presently being impacted by the waste disposal site. These requirements are:

1. Ground water monitoring wells to be sampled - C, F, and I;
2. Measure water levels - all accessible monitoring wells;
(A contoured ground water elevation map will need to be submitted with this data on it.)
3. Laboratory analysis - VOC portion of Table 1 in ARM 16.14.706;
4. Limited sampling schedule - Spring 1995, and Fall 1995;

Without a site-specific Sampling and Analysis Plan (SAP) for this project, it is important that sampling and analysis be conducted according to standard RCRA Technical Enforcement Guidance Document (TEGD) September 1986, procedure/protocol. This would include the following quality assurance/quality control (QA/QC) sample blanks be collected and analyzed for VOCs by the lab: trip blank, equipment blank, and duplicate well sample. Bear in mind, these QA/QC samples are the most efficient method of checking ground water analytical results to determine that no outside contaminants have been introduced into the ground water samples, either through decontamination solution or decontamination procedures, or during the transportation of the samples from the site to the laboratory. QA/QC sampling and analysis prevents the need for re-sampling in the event that outside contaminants have been introduced into the sample(s).

The Department also strongly recommends sampling the new supply well that was installed in 1992, in the north part of the facility. Assuming the water from this well is used for human needs, such as washing and drinking, it is in the County's and the Forest Service's best interest to have the quality of the ground water from this well sampled for VOCs. Also, consider sampling the water from this well for inorganics, especially heavy metals (which may be naturally occurring in this area) to ensure protection of human health.

Following a review of the analytical results by the Department, the Forest Service, and the County, of the two sampling events, we should be able to determine more precisely if the landfill is impacting the natural quality of the ground water in the area. If no impacts are detected, it may be possible to discontinue further sampling.

West Yellowstone Landfill (closed) ON MEMO

Page 3

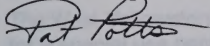
December 12, 1994

AL USE PERMIT - WASTE TRANSFER SITE/CLOSED LAND FILL
WEST YELLOWSTONE/HEBGEN BASIN SOLID WASTE DISTRICT

USDA - Forest Service
Hebgen Lake Ranger District
Gallatin National Forest

The Department appreciates the time and concern you have put into this project, and we sincerely hope that this final effort will prove satisfactory to all concerned parties.

Sincerely,



Pat Potts

Environmental Specialist

cc: Gary L. Benes, District Manager, Hebgen Lake Ranger District,
P.O. Box 520, West Yellowstone, MT 59758

Patricia Hesch, Hebgen Lake Ranger District, P.O. Box 520, West
Yellowstone, MT 59758

Kathy Gallagher, Consulting Hydrogeologist, P.O. Box 1827,
Bozeman, MT 59715

Jacquelyn F. Stonnell, RN, MPH, Gallatin County Health Officer,
311 W. Main, Room 4, Bozeman, MT 59715

path: sw\gallwyel.mon

file: Gallatin Co/W. Yellowstone/grd wtr (corr)

2720 (1950)

DECISION MEMO

**SPECIAL USE PERMIT - WASTE TRANSFER SITE/CLOSED LAND FILL
WEST YELLOWSTONE/HEBGEN BASIN SOLID WASTE DISTRICT**

USDA - Forest Service
Hebgen Lake Ranger District
Gallatin National Forest
Gallatin County, Montana

PROPOSED ACTION

The West Yellowstone/Hebgen Basin Solid Waste District (WY/HBSWD) of West Yellowstone, Montana, has applied for a special use permit for the purpose of continuing the operation of a solid waste transfer facility and maintaining a closed landfill. This facility is used year-round. The Gallatin National Forest proposes to reissue this permit for continued use of the area which has been authorized since 1971. No change in use is planned. The previous permit terminated on December 31, 1993, and the new authorization would expire on **December 31, 2004**.

The area requested for authorization is approximately four (4) miles north of the town of West Yellowstone, in Section 3, T13S, R5E, P.M., Gallatin County, Montana. The entire permit area would total **12.64 acres**, to be occupied and used as follows:

- Active Waste Transfer Site and Associated Facilities	5.67 acres
- Closed Landfill Site	6.36 acres
- Access Road	0.61 acres
- Nine (9) Ground Water Monitoring Wells	(included)
TOTAL	12.64 acres

DECISION

Under authority of the Organic Administration Act of June 4, 1897, (30 Stat. 11, as amended; 16 U.S.C. 473-475, 477-482, 551; 6/4/87), it is my decision to issue a special use permit to the West Yellowstone/Hebgen Basin Solid Waste District for the purpose of continuing operation of an active solid waste transfer facility and maintenance of a closed landfill. Under this authorization, WY/HBSWD will be responsible for the transfer facility (5.67 acres), the closed landfill (6.36 acres), the access road (0.61 acres), and the nine (9) ground water monitoring wells, for a total of **12.64 acres**.

In making this decision, I considered the following:

- The facility provides a much needed public service for the growing Hebgen Basin community.
- No private land is available to provide this service.
- This decision would authorize continued use of a site which has been used for waste disposal and transfer since 1971. The existing transfer facilities have been in place since 1984, and landfill closure was accepted by the State in 1989.
- The area to be authorized exceeds five (5) acres, the area specified under FSH 1909.15, Section 31.2 - 3, criteria for exclusion from review in an environmental assessment or environmental impact statement. The original landfill area occupied ten (10) acres, which is completely fenced. Current activity occurs on fewer than five (5) acres within the fence. The scale, scale-house, and restroom facility are located outside the fence. The transfer facility, within and outside the fence, is 5.67 acres. The access road occupies an additional 0.61 acres. Activity occurs on a total of about 6.28 acres. However, activities are intermittent and would not impact over 5 acres of land at any one time.
- Continued use of the transfer facility, access road, and monitoring wells to ensure the integrity of the closed landfill will not likely adversely affect wetlands and floodplains; threatened, endangered, sensitive or proposed species or their habitat; nor scientific, cultural, or historic values.

2720 (1950)

DECISION MEMO

WY/HBSWD

Page 2

This decision is contingent upon the following requirements:

- The site will be used **only** for the transfer of solid waste. **No new garbage will be buried at the site.**
- In accordance with recommendations from the Montana Department of Health and Environmental Sciences (MDHES) and as a permit condition, WY/HBSWD will be required to monitor ground water for volatile organic compounds, as provided in the Administrative Rules of Montana 16.14.706, Table 1, and as described under **BACKGROUND**, which follows.

BACKGROUND

WY/HBSWD is an entity of Gallatin County government, operated by a board of directors. The board meets monthly and is responsible for operation of the facility and compliance with the terms of the special use authorization. In addition, the board sets fees, issues bills to residents, and negotiates with the waste management contractor.

The site was used as an open landfill from 1971-1988. In 1984, transfer facilities including a scale, scale-house, enclosed transfer building, and roll-off container platform were built. At that time, Class II garbage consisting of normal household waste was no longer disposed of on the site, but was transferred to an approved landfill in Logan, Montana. Class III garbage consisting of furniture, building materials, and other nontoxic debris was accepted at the West Yellowstone site until 1988 when the open landfill was permanently closed and capped. **Burying refuse is no longer permitted at this site.**

Since 1988, the site has been used only as a transfer facility. Garbage is hauled to the site by a local waste management contractor and by local citizens. When transfer containers are full, the garbage is hauled by the contractor to the landfill in Logan, Montana. Waste management contract agreements exist between the holder and the contractor, and the Forest Service is not a party to these agreements or contracts.

Future use of the site is expected to continue, as it has since 1988, as a waste transfer facility. Refuse will be hauled to a certified landfill for disposal.

The Madison River, a nationally recognized blue-ribbon trout stream, flows westerly out of Yellowstone National Park approximately 1/2 mile south of the landfill and waste transfer facility. Concern over potential ground water contamination led to the drilling of nine water monitoring test wells in August 1977, and subsequent closure of the landfill in the 1980s. One of the wells is within the boundary of Yellowstone National Park. In 1992, an additional well was drilled north of the transfer area to provide running water for a restroom facility used by the scale-house attendant.

As part of the landfill closure plan drafted by MDHES, the WY/HBSWD was required to perform annual ground water sampling for at least three years after the landfill area was closed (MDHES letter dated 5/5/88). Testing was performed intermittently from 1988-93. Sampling for such compounds as chloride, sulfate, iron, manganese, and zinc, revealed reduced levels of these compounds, and therefore improved ground water quality following dump closure.

Forest Service environmental engineering specialists concluded the test results and statutory requirements do not warrant requiring WY/HBSWD to install any additional wells. The specialists also determined that no further monitoring is warranted for hazardous materials (HAZMAT) because the West Yellowstone/Hebgen Basin community is not: 1) a large population center; 2) a major industrial or manufacturing center; or 3) an agriculture center with high use of pesticides, fertilizers, or other agricultural chemicals.

The Forest Service also consulted with MDHES to determine if the State would require continued ground water monitoring. Based on available ground water monitoring data, MDHES determined there was not enough information to support clean-up recommendations or declaring the area a Superfund site.

The MDHES closure plan also requires that "some indicator organic parameters be monitored as well, such as pesticide residues, solvents, fuels or other appropriate indices of land fill contamination." These items are classed as Volatile Organic Compounds (VOCs). MDHES concluded that previous analyses did not include testing for VOCs, which are pollutants that would not occur naturally in a ground water system. VOCs would only be present in ground water if they were introduced by some unnatural influence, such as leakage from buried waste. Gasoline and oil, refrigerator gases, and other types of industrial waste items could be contributors to VOC pollution.

2720 (1950)

DECISION MEMO

WY/HBSWD

Page 3

Because testing for VOCs has not been done since the landfill was closed, MDHES recommends a minimum of three wells (wells C, F, and I) be tested for VOCs as provided in the Administrative Rules of Montana (ARM) 16.14.706, Table 1. If water sample analysis from these wells shows the presence of VOCs, a monitoring schedule would then be established, and MDHES would recommend corrective actions that WY/HBSWD should take. VOC analysis would resolve any concerns that leachate from the closed landfill may be contaminating the ground water system, and would ensure the natural water quality of the nearby Madison River.

SCOPING AND PUBLIC INVOLVEMENT

The Forest Service has published notice of the proposed project twice (April-June 1994 and July-September 1994) in the quarterly NEPA project listing.

The Forest Service also consulted with MDHES, and through this process, developed the necessary ground water monitoring requirements for the permit.

CATEGORICAL EXCLUSION

The proposed action may be categorically excluded from documentation in an environmental assessment (EA) or environmental impact statement (EIS) under FSH 1909.15, Section 31.2 - 3, "Approval, modification, or continuation of minor special uses of National Forest System lands that require less than five contiguous acres of land."

FINDINGS OF CONSISTENCY AND SIGNIFICANCE

The proposed action is consistent with management direction in the Land Management Plan for the Gallatin National Forest, (Forest Plan Objectives-Chapter II, p. 27, 12.c. items 1-4; pp. III-40-43; Appendix G, pp. G-3, G-30-34 VIII.). The proposal is also consistent with the Organic Administration Act (30 Stat. 11, as amended; 16 U.S.C. 473-475, 477-482, 551; 6/4/87).

The following findings indicate that no extraordinary circumstances exist which might cause the proposed action to have significant effects:

1. No significant beneficial or adverse impacts are likely to result from the proposed action.
2. The proposed action will benefit public health and safety. The proposal provides a convenient, controlled location for the local community to dispose of household and industrial garbage. This facility negates the need to develop another, perhaps less desirable, waste treatment site.
3. The site is adjacent to the west boundary of Yellowstone National Park, approximately 1/2 mile north of the Madison River, and about four (4) miles north of the town of West Yellowstone.

The proposed action will not likely affect historic or cultural resources, park lands, prime farm lands, wetlands, wild and scenic rivers, or other ecologically critical areas.

As a condition of the proposed action, the holder will be responsible to monitor ground water for specific potential contamination (VOCs).

4. Effects of the proposed action on the quality of the human environment are not likely to be highly controversial. The facility is well maintained and completely fenced-in. There are no residences or recreation areas within sight distance of the facility, and it is not visible from Highway 191, the main access point.
5. The expected effects of the transfer facility and closed landfill are minor, and do not involve highly uncertain, unique or unknown risks because of detailed planning and analysis by the Forest Service and MDHES, and proper management by WY/HBSWD.

2720 (1950)

DECISION MEMO

WY/HBSWD

Page 4

6. The proposed action will not set a precedent for future actions with possible significant effects. Each individual special use request must be analyzed and evaluated on its own merit, and decisions to issue or renew authorizations will be made on a case-by-case basis.
7. This proposed action is not related to other actions with individually significant but cumulatively significant actions.
8. The Forest Archeologist examined the site and found no items of cultural resource significance or concern. The proposed action will not cause loss or destruction of significant scientific, cultural or historical resources.
9. The proposed action is within occupied grizzly bear habitat categorized as Management Situation II (MS-II), (Gallatin National Forest Plan, p. G-3, 9/87). The grizzly bear is classified as a threatened species under the Endangered Species Act (ESA, P.L. 93-205, 12/28/73). MS-II areas lack distinct grizzly population centers, but may be used occasionally by grizzlies, and may contain habitat suitable for grizzly bear survival and recovery.

The entire landfill and transfer site facility is enclosed by an eight (8) foot high chain link fence with barbed wire strands on top of it. There is no exposed garbage to serve as an attractant to bears. The special use permit will contain a Grizzly Bear Management and Protection Plan.

The Madison River is about 1/2 mile south of the waste transfer facility. Bald eagles, classified as endangered under ESA, forage along the river. However, the project area is not within any known eagle nesting area.

The District Wildlife biologist was consulted regarding the proposed permit renewal, and had no concerns regarding threatened, endangered, or sensitive wildlife species or their habitat.

10. The proposed action will not violate nor threaten to violate any federal, state, or local law or requirement imposed for the protection of the environment.

ADMINISTRATIVE REVIEW OR APPEAL OPPORTUNITIES

Pursuant to 36 CFR 215.8(a)(4), this decision is not subject to administrative review or appeal.

IMPLEMENTATION

This decision may be implemented immediately.

CONTACT PERSON

The case file including the environmental analysis for this project is available for review at the Gallatin National Forest Supervisor's Office and at the Hebgen Lake Ranger District. For further information regarding the proposed action or this decision, please contact:

Patricia C. Hesch
Hebgen Lake Ranger District
P.O. Box 520
West Yellowstone, MT 59758
Phone (406) 646-7369
FAX (406) 646-9632

Richard H. Luman
For DAVID P. GARBER
Forest Supervisor

6/20/94
DATE

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL

of pages 7

To: <i>Pat Rans</i>	From: <i>Pat Hesch</i>
Dept./Agency: <i>6</i>	Phone #: <i>446-7369</i>
Fax #: <i>449-1499</i>	Fax #:

NSN 7540-01-317-7368

5099-101

GENERAL SERVICES ADMINISTRATION

DEPARTMENT OF HEALTH AND

TED SCHWINDEN, GOVERNOR

STATE OF MONTANA

Solid & Hazardous Waste Bureau
Telephone: (406) 444-2821

HELENA, MONTANA 59620



May 5, 1988

Larry Wanner, Chairman
West Yellowstone - Hebgen Basin Solid Waste District
P.O. Box 239
West Yellowstone, Montana 59758

Dear Larry:

We have received a set of closure plans from Damschen & Associates for the reclamation of the Class III landfill site at West Yellowstone. As we discussed at the last meeting I was able to attend, cessation of landfill activities at the site and proper closure should dramatically lessen the groundwater contamination problem evident at the site.

As you are aware, the Department has seriously considered the merits of requiring a synthetic "liner" or cap over the finished landfill to positively seal out infiltration of moisture into the buried waste. Due to the fact that the site already has a leachate plume from the landfill and there is no soil available to provide anything other than a sand cap, we feel that a synthetic cap would be justified in order to stop the groundwater contamination which has been documented and the probable release of leachate into the Madison River. However, we also appreciate the fact that the estimates of the cap, labor, engineering, etc., are in the \$100,000 to \$125,000 range and that would be difficult for a small district to raise.

For these reasons the department has made the decision to defer the requirement for such a liner pending receipt of additional information regarding the current plume and the effect of closure of the landfill with only a soil cap.

You are advised, however, that an adequate cap, including a liner, if necessary, may be required at any time. If the next sample shows contamination levels have increased, for example, we reserve the right to order the district to undertake appropriate remedial measures at any time. Additionally, if the sand cap does not do an adequate job of decreasing contamination levels, we would expect to require that capping or other appropriate measures be instituted immediately. We would expect a decision upon this part of final closure within a three year period.

Therefore, we approve the final closure plan submitted for the landfill with the following conditions:

1) The district shall arrange for a final inspection of the completed closure activity, and written certification of adherence to the plan shall be submitted to the department.

2) The groundwater sampling plan will be modified as follows:

a) Annual groundwater quality sampling will be conducted for at least the next three (3) years.

b) Well logs for the existing sampling wells must be submitted to this department.

c) The district shall retain the services of a qualified consultant to address the current vertical and horizontal extent of the contamination plume from the landfill. At least one "downstream" sample will be taken from a well from a point deep enough in the aquifer to determine if the area of greatest concentration of the plume has been detected and is being adequately monitored. In addition to the inorganic parameters being currently sampled, we will require that some "indicator" organic parameters be monitored as well, such as pesticide residues, solvents, fuels or other appropriate indices of landfill contamination. Selection of appropriate parameters will be the responsibility of your consultant with approval of the department a requirement prior to sampling.

3) If groundwater sampling shows that the plume has reached the Madison River, the district will arrange to have "upstream" and "downstream" sampling done in the river in order to determine the impact, if any, on surface water resources.

4) The district may want to consider stockpiling a quantity of soil adequate to provide cover over a synthetic liner if such a liner is required. According to my discussion with Barry Damschen, this would involve approximately one third of the available material from the town.

5) As an alternative to the prospect of a liner for the landfill, I would recommend that the district investigate the possibility of preparing a comprehensive plan for revegetating the cover at the site, including addition of organic soil amendments as necessary to insure adequate survival of a non-irrigated cover crop. Even though this would involve some expense, it might save some of the cost of a liner and have longer lasting effects. I'm quite sure the Forest Service would have the expertise to assist with a plan such as this. Again, the department will have to approve such a plan and still reserves the right to require any other appropriate closure measures.

5) Before the prospect of adequate capping is abandoned at this time, we request that the Soil Conservation Service be contacted to find out if there are any areas nearby from which it might be possible to obtain clay capping soils. I understand from talking to Emery Nelson that there may be less permeable materials available at the north end of the "basin" near the cemetery. Whether or not these would be available for use is unknown. We request that the district contact the S.C.S., find out whether such soils exist and advise us whether any are available. Even some addition of tighter soils to the sand cap could greatly increase it's effectiveness.

Fill in bentonite

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One final matter still needs to be resolved, and that concerns the maintenance of a "concrete fill" area at the site. Since maintenance of any kind of landfilling activity at the site must be approved by the department, we request that you submit a plan of operation for the "concrete fill" area, including details of the following:

- 1) How the area will be supervised to insure that only inert wastes such as concrete will be disposed of at the site, and;
- 2) How much of this waste the district will accept and what physical limits of the fill area will be, and;
- 3) Since periodic and final cover will be necessary over this waste, where this cover will be obtained, and how the area will be finally reclaimed.

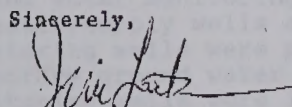
Frankly, the Department is strongly opposed to any continuation of landfilling at the site for several reasons, principally the experience we have seen with inadequate supervision of wastes at the existing landfill, and the fact that there will no longer be appropriate cover materials available for continued landfilling. Unless and until the district comes up with an approvable plan to address these items, we will not approve continuation of landfilling at the site in any fashion once closure is completed.

* We would appreciate your written confirmation of the requirements set forth in this letter.

Under separate cover, I have sent a letter modifying your transfer station license to include the new forty yard container site.

If you have any questions, or we may be of additional service, please contact us.

Sincerely,


James E. Leiter, R.S.

cc: Edward King, M.D., Health Officer

Emery Nelson, R.S.

Board of County Commissioners, Gallatin County

Forest Supervisor, U.S.F.S., Gallatin National Forest, Box 130,
Bozeman, MT 59715

Ralph Maier, U.S.F.S., District Office, West Yellowstone, MT 59758

ROUTE SLIP

DEPARTMENT OF HEALTH & ENVIRONMENTAL SCIENCES

TO:

Hoof & H

DATE:

7/20/93

1.

Pat C. FAE

2.

Jon D. JD

3.

Roger T. R

☒ Approval

☐ Comment

☐ Necessary Action

☐ Note and Return

☐ Note and File

☐ Investigate

☐ Prepare reply

☐ Signature

☐ See Me

☐ As requested

☐ For your information

☐ Per Conversation

REMARKS:

SW/yellstone let

FROM:

3

*mailed
7-23-93
en*

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES
Solid and Hazardous Waste Bureau
Solid Waste Program
(406) 444-1430

MARC RACICOT, GOVERNOR

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE LOCATION 836 Front Street
Helena, Montana

MAILING ADDRESS: PO BOX 200901
Helena, MT 59620-0901

July 21, 1993

Gary L. Benes, District Manager
Hebgen Lake Ranger District
P.O. Box 520
West Yellowstone, Montana 59758

RE: WEST YELLOWSTONE CLASS II LANDFILL (CLOSED), GALLATIN COUNTY
LICENSE NO. 237
GROUND WATER MONITORING STATUS

Dear Mr. Benes:

This letter is in response to a request from Patricia Hesch with your office, requesting ground water monitoring information at the closed West Yellowstone Class II Landfill. The class II landfill portion of this facility was closed in 1988, according to closure standards effective at that time. These standards may have been quite minimal compared to today's requirements which include: 2 feet of cover material of which 18 inches is compacted to a minimum of 10^{-5} cm/sec based on the permeability of the base of the landfill material, and 6 inches of topsoil and vegetation on the surface for erosion control. It is entirely possible that infiltration through the existing cover material may be occurring in response to heavy precipitation events.

Ground water monitoring began in 1976 and included 2 domestic/supply wells and 2 "pilot" monitoring wells. The monitoring wells were poorly installed and were only to serve as temporary ground water monitoring points. In 1977, eight new monitoring wells were installed to the south-southwest, and one background well was installed northeast of the site. A seep located west of Highway 191, along the north side of the Madison River floodplain was also included in the sampling network (see map attached).

Please refer to the attached "Sampling Schedule" for exact dates and sampling parameters. Sampling was conducted twice in 1977 and 1978. Sampling was skipped in 1979. In 1980 through 1982 sampling was conducted, but the parameters analyzed were extremely limited. No sampling was conducted in 1983 or 1984. An event was reported in 1985, but no sampling was conducted for 3 years (1986, 1987, 1988) following this event. In 1989 and 1990 yearly sampling events were conducted. Sampling was omitted

July 21, 1993

in 1991. In 1993, the wells were sampled however, MW-A had animal hair in it, MW-G had so much hair and decayed rodent parts in it that it was not able to be sampled, and the seep was not able to be located probably due to lack of flow.

Analytical sampling parameters included variations on a limited group of inorganic parameters, and in some cases a short list of metals (dissolved or totals). Based on these analytes only the metals could provide a direct indication of contamination in the ground water. The other inorganic parameters serve only as indicators or precursors to chemical contamination yet to be detected as it migrates into the ground water. Unfortunately, sampling parameters/constituents were never extended to include the obvious chemical constituents normally associated with leachate generation from a landfill (e.g. tetrachloroethene, trichloroethene, 1,1-dichloroethane, dichlorodifluoromethane, etc.).

Based on the below-standards installations of the nine ground water monitoring wells, concern arises as to the actual effectiveness of the monitoring well network. The monitoring wells were completed and screened (i.e. perforated and/or slotted) in the upper 2 to 3 feet of the aquifer, due to caving of the hole prior to casing placement. This permits only the upper few feet of the aquifer to be sampled and is not representative of the water quality throughout the entire aquifer which may be 50 to 100 feet thick. Leachate contaminants are composed of liquids that are in many cases denser than water. Therefore, it is important to have representative data from the entire aquifer section. If the aquifer is 50 to 100 or more feet thick, it may be necessary to set cluster monitoring wells to determine the depths to which the ground water is impacted.

In summary, the Montana Department of Health and Environmental Sciences Solid Waste Program (the Department) believes that:

- 1) Ground water analytical data is inadequate from the limited inorganic parameters and metals analyzed to definitively determine if contaminant constituents are, or have in the past migrated from the landfill into the ground water.
- 2) Monitoring well installations do not adequately address the possible vertical downward migration of contaminant constituents in the ground water, nor is the existing network sufficient areally to adequately delineate the lateral extent of any possible plume(s) emanating from the landfill (i.e. westward).

July 21, 1993

3) The possible source of ground water contamination from the landfill would not have decreased through time sufficiently enough to ignore the need for a lower permeability cap.

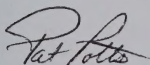
The consensus of the County has been that the parameter concentrations have decreased over time, and ground water sampling should no longer be required. The County has also contented that the cost of sampling for volatile organic compounds (VOCs) in the ground water would be an economic burden on the County. The County did install a supply well in 1992, on the north side of the site for a water source for the transfer station. This well was appropriately completed in conjunction with State rules, so that it could satisfactorily serve as a monitoring location.

The Department is of the technical opinion that from the extremely limited list of parameters analyzed, and the irregularity with which the sampling events have been conducted, as well as the inconsistency of sampling parameters from one event to another, it is impossible to determine if the landfill has, is, or will in the future impact the quality of the ground water in this area.

Due to the sensitive nature of this location, it would be in the County's and the Forest Service's best interest to at least sample on a semi-annual basis for the full list of required parameters and chemical constituents as provided in the Administrative Rules of Montana (ARM) 16.14.706 Table 1. The reason Gallatin County has not been required to sample according to normal landfill protocol, is that the facility was closed before the Ground Water Monitoring Rules (Subchapter 7) became effective in October 18, 1991.

This is a very brief overview of the ground water monitoring situation at the closed West Yellowstone Class II Landfill. If I can be of any additional assistance, please give me a call.

Sincerely,



Pat Potts
Environmental Specialist

Attachments - Sampling Schedule

Map: existing ground water monitoring network

West Yellowstone Class II Landfill

Page 4

July 21, 1993

cc: Patricia Hesch, (address above)

A.D. Pruitt, Gallatin County Refuse District No.1, P.O. Box
146, Manhattan, MT 59741

Julie Lethert, Environmental Health Specialists,
Environmental Health Services, 311 W. Main, Room 3, Gallatin
County Courthouse, Bozeman, MT 59715

West Yellowstone/Hebgen Basin Refuse District, Courthouse,
Bozeman, MT 59715

Bruce Siegmund, Damschen & Associates, Inc., P.O. Box 4817,
Helena, MT 59604

path: sw\yellstn.let

file: gallatin co/west yellowstone (closed)/grd wtr

WEST YELLOWSTONE -- CLASS II LANDFILL
SAMPLING SCHEDULE

9 Monitoring
Wells Installed
8/30/76

WY R.S. Well

Cd
Cr
Fe
Hg
Mn
Pb
pH
Co₂
Cu
Fe
Hg
Mg
Mn
Na
No₃
Pb
pH
Hg
Mn
TDS

WY Nat'l Park

Cd
Co₂
Cr
Fe
Pb
pH
Hg
Mn
TDS

NW Pilot MW &
SW Pilot MW
2,4-D

As
BOD
Ca
Cd
Cl
COD
Co₂
Cr
Cu
Fe
Hg
Mg
Mn
Na
pH
Pb
Po₄
So₄
TDS

9/8/77
As
Ca
Cd
Cl
COD
Co₂
Cu
Fe
Hg
Mg
Mn
Na
No₃
Pb
pH
Po₄
Sc
So₄
TDS

9/9/77
As
Cd
Cl
Co₂
Cr
Hg
No₃
Pb
pH
Sc

8/1/78
Fe
Pb(d)
TDS
Zn(d)

10/4/78
Fe
Pb(d)
TDS
Zn(d)

6/25/80
TDS

7/20/81
Fe
Pb
TDS

1982
Fe

1983

1984
Cl
Fe
Pb
pH
So₄
TDS
Zn

1985
Cl
Fe
Pb
pH
So₄
TDS
Zn

1986

1987

1988
CaCO₃
Cl
Fe
Hg
Mn
Pb
pH
So₄
TDS
Zn

10/4/89
CaCO₃
Cl
Fe
Hg
Mn
Pb
pH
So₄
TDS
Zn

10/24/90
CaCO₃
Cl
COD
Fe
Mn
pH
So₄
TDS
Zn

1991

9/26/92
CaCO₃
Cl
COD
Fe(d)
Mn(d)
So₄
TDS
Zn

1993

"Target Levels"
pH = 6.5-8.5
Sc = 100
TDS = 150 mg/l
CaCO₃ = 50 mg/l
CL = 10 mg/l
So₄ = 5 mg/l

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES



STAN STEPHENS, GOVERNOR

COGSWELL BUILDING

STATE OF MONTANA

FAX # (406) 444-2606

HELENA, MONTANA 59620

Solid & Hazardous Waste Bureau

Telephone: (406)444-2821

February 1, 1990

West Yellowstone/Hebgen Basin Solid Waste District
P.O. Box 239
West Yellowstone, MT 59758

Dear Board Members:

I have reviewed Damschen & Associates December 20, 1989 letter to you regarding results of groundwater sampling and assessment which Curt Coover completed in October, 1989. In December, Curt and I met and discussed the results, their interpretation and Damschen & Associates recommendations for continued monitoring.

We concur with the conclusions and recommendations which Curt makes in the report. The district should plan to implement the recommendations as soon as possible. It will be important for the monitoring plan to be updated in accordance with these recommendations for the state to certify proper closure of the landfill and eventual acceptance/rejection of the landfill cap as adequate. While the new "Subtitle D", federal regulations for landfills have not yet been finalized, it appears likely that the West Yellowstone landfill may not be included due to the closure and monitoring measures you are instituting at the site. Of course, should the final regulations change, applicability of these new regulations to the site might also change, however I consider that unlikely. As it stands now, future requirements for monitoring will be based upon state requirements, which are considerably more flexible and should be significantly less expensive.

Should continued monitoring confirm that the current landfill cap is adequately contributing to a reduction of contaminants leaking from the site, we will be able to officially accept it and will consider the site "closed". After that time we will make every effort to minimize future monitoring requirements and costs within the limits of the district's liability for environmental impact from the landfill. Should additional monitoring show the cap is ineffective, however, the department still reserves the right to require the district to provide a cap which meets the minimum requirements of state landfill regulations. In addition, since the groundwater contamination from the site has not been totally characterized, additional information on the leakage from the site could affect approval

of the existing cap. We would still recommend that the district do whatever is possible to revegetate the final cap to insure that maximum stability of the cap is provided and that as much moisture as possible is "wicked" from the cover soils.

The recommendations included in Damschen & Associates report are:

- 1) A new well should be drilled in a westerly direction from the landfill in order to detect the true direction of groundwater flow. This well should be completed deeper in the aquifer than the other nine wells. Aquifer tests should be conducted and the well should be sampled at several levels.
- 2) Sample parameters should be altered as appropriate. This includes eliminating those inorganic parameters which have not been detected in order to save sampling costs. This also includes addition of organic sampling in order to determine the quality of the seepage from the landfill.
- 3) All wells should be resurveyed and the groundwater elevations should be accurately measured. This data, in conjunction with tests of the new well as noted in item #1, should be used to determine the groundwater flow direction.

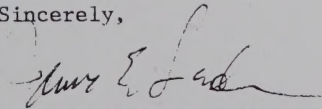
The Department hereby requests that the district proceed with these tasks. Since the plume from the landfill does not seem to be directly intersecting water that is being used for domestic or other beneficial uses, it is our determination that the new well may be installed anytime prior to the next sampling event which should be fall, 1990. Installation at that time should allow aquifer tests and comprehensive sampling to be completed at the same time.

In addition to these requirements, the district must proceed with development of a long term monitoring plan for the landfill. This plan can only be developed after the new well is installed, proper tests are conducted and conclusions reached. The district will be required to submit this monitoring plan for approval at the conclusion of the fall, 1990 sample period.

We request that you provide us a written acknowledgement of receipt of this letter and a time schedule for installing the new well, completing the next sampling event and completion of a monitoring plan for the landfill.

If you have any questions, or if I may be of additional service, please contact me.

Sincerely,


James E. Leiter, R.S.
Solid Waste Program Manager

cc: Damschen & Associates

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

MEMORANDUM

TO: West Yellowstone File

FROM: Jim Leiter

DATE: Sept. 7, 1989

SUBJ: Meeting with Curt Coover and Barry Damschen, Damschen & Associates

Yesterday we met with Curt and Barry to discuss the work plan they propose to address groundwater concerns at the West Yellowstone landfill site. They mentioned that "Seep J" at the landfill dumps into a marshy area contiguous with the river and the seep appears to be landfill leachate. They described it as very bad, with an oily or greasy sheen on it.

Someone should check this the next time we have the opportunity.

FOR THE INFORMATION OF THE

MEMORANDUM FOR THE

DATE: MAY 1, 1952

SUBJECT: Meeting with Carl Linder and Harry Johnston, Research & Development

Yesterday we met with Carl Linder and Harry Johnston to discuss the work plan they propose to submit to the Research & Development Committee at the next Y-12 meeting (tentative date). They mentioned that "Group 2" at the Los Alamos Laboratory is working on a series of experiments with the view of the work proposed to be done at the Los Alamos Laboratory. They described it as very hard, with no help or money shown in it.

Johnston should check this the next time we have the opportunity.

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES



STAN STEPHENS, GOVERNOR

COGSWELL BUILDING

STATE OF MONTANA

FAX # (406) 444-2606

Solid & Hazardous Waste Bureau
Telephone: (406) 444-2821

HELENA, MONTANA 59620

September 7, 1989

Curt Coover
Damschen & Associates, Inc.
2030 11th Ave., Suite 11
P.O. Box 4817
Helena, MT 59604

Dear Curt:

Thanks for your letter and for meeting with us about the proposed work plan for the West Yellowstone Landfill site. As we discussed, the plan seems to be the most appropriate "first step" in addressing a complete impact assessment and groundwater monitoring plan for the landfill. We concur in your recommendations to the district and approve of this step in the process.

Please keep me advised of your progress and any changes to this work plan.

Sincerely,

A handwritten signature in cursive script, appearing to read "James E. Leiter".

James E. Leiter, R.S.

cc: Larry Wanner, Chairman, West Yellowstone/Hebgen Basin Solid Waste
District, P.O. Box 239, West Yellowstone, MT 59758
Emery Nelson, R.S., Gallatin County Health Dept.
Ralph Meyer, U.S.F.S., West Yellowstone, MT 59758

Parameter	Average Concentration In Background Well (E)	Highest Concentration In Well A	Average Concentration In Well A	Drinking Water Standards	Recommended Concentration For Stopping Monitoring	Explanation
PH 1.40	7.1	6.0 * * lowest PH level	6.2	6.5-8.5	—	I would check PH on any well that is sampled for other parameters.
Specific Conductance 1.90	65 $\frac{\mu\text{mhos}}{\text{cm}}$	866 $\frac{\mu\text{mhos}}{\text{cm}}$	667 $\frac{\mu\text{mhos}}{\text{cm}}$	NA	100 $\frac{\mu\text{mhos}}{\text{cm}}$ *	* Actually, I think that specific conductance should be checked on all the monitoring wells as long as any well is above the S.C. of the background well (or possibly fall back to any well above 100 $\mu\text{mhos/cm}$). The Forest Service has equipment to measure PH and S.C. in the field. When the monitoring falls back to just PH & S.C. the Forest Service may be able to do it with existing equipment.
TDS 14.80	78 mg/L	574 mg/L	488 mg/L	500 mg/L	<150 mg/L	The TDS of the downstream wells was less than 150 mg/L in 1978. Downstream wells will probably drop out of TDS testing after 1985. Ultimately (5-10 years) we can probably use the specific conductance test as the indicator of TDS.
Alkalinity 10.50	30 mg/L (1 sample)	300 mg/L (1 sample near well C)	206 mg/L (Average of 4 sample from wells B, E, & D)	NA	<50 mg/L	Alkalinity is a good indicator parameter. We do not have many alkalinity test results from previous monitoring. I suspect that most of the downstream wells will be below 50 mg/L in 5-10 years.

Parameter	Average Concentration In Background Well (E)	Highest Concentration In Well A	Average Concentration In Well A	Drinking Water Standards	Recommended Concentration For Stopping Monitoring	Explanatory
COD 45136	12.8 mg/l	654.9 mg/l	437.5 mg/l	NA	< 50 mg/l	It appears that the COD drops rapidly at the sampling points downstream from the landfill site. 5 or 6 of the wells are probably below this level now. This should be one of the best indicators of the reduced contamination from leachate through the old garbage cells. This is supposed to be a good indicator to monitor around landfills. I suspect that most of the downstream wells are below this limit now. Except for its value as an indicator, there could be a good argument to drop this altogether because the level is so far below the drinking water standards. Again, Zinc is supposed to be another good indicator but the highest levels recorded are far below the drinking water standards. Most downstream wells should drop out of the program after the first set of samples in 1985.
Sulfate 10195	1 mg/l 1 Sample	14 mg/l (1 sample near well c)	10 mg/l (Average of 3 samples from wells B & C)	250 mg/l	< 5 mg/l	
Zinc 3190	0.03 mg/l	0.17 mg/l	0.09 mg/l	5 mg/l	< 0.07 mg/l	

Parameter	Average Concentration In Background Well (E)	Highest Concentration In Well A	Average Concentration In Well A	Drinking Water Standards	Recommended Concentration For Stopping Monitoring	Explanation
Lead 3.90	0.005 (1 sample)	1.9 mg/l (Near well C)	0.55 mg/l (Average of 5 samples from wells B & C)	0.05 mg/l	< 0.05 mg/l	The level of lead measured in wells closest to the landfill decreased during the monitoring accomplished from 1976 to 1978. Most of the wells should fall below the 0.05 mg/l in the 1985 samples and be dropped from lead monitoring.
Chloride 11.40	3 mg/l (1 sample)	33 mg/l (near well C)	12 mg/l	250 mg/l	< 10 mg/l	Chloride is another good indicator parameter. Downstream wells were below 10 mg/l in 1978. Levels below 10 mg/l compared to the background well of 3 mg/l probably are not meaningful.
Iron 3.90	0.017 mg/l	91.6 mg/l	61.9 mg/l	0.3 mg/l	< 3.0 mg/l	Iron levels in the downstream wells were below 3.0 mg/l level in 1978. Wells in the immediate area of the landfill were well above the 3 mg/l level.

RECEIVED

FEB 22 1983

MONTANA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SCIENCES
SOLID WASTE SECTION



DAMSCHEN & ASSOCIATES, INC.
CONSULTING ENGINEERS

2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59601
TELEPHONE (406) 449-8627

September 6, 1989
File: 89-44B

Mr. Jim Leiter
State of Montana
Solid and Hazardous Wastes Bureau
Cogswell Building
Helena, Montana 59602

Dear Jim:

This letter follows our meeting with the West Yellowstone/Hebgen Basin Refuse District on August 9, 1989 in which we discussed the groundwater monitoring program at the closed West Yellowstone municipal landfill. As we understand it, the State Solid and Hazardous Wastes Bureau has requested that the City of West Yellowstone submit a monitoring plan for the groundwater in the landfill area.

The groundwater in the area of the landfill has been previously monitored on a sporadic basis by the Forest Service. Two test wells were drilled and completed as crude monitoring wells in 1977. These wells were not installed as true monitoring wells and proper water samples are apparently not attainable. In 1978, nine monitoring wells were installed in and around the dump site and a monitoring program was established. As we discussed in our meeting, we feel that this prior work has a few shortcomings and modifications to the current monitoring program will be required to adequately assess the site hydrogeologic conditions.

More specifically, the following items are insufficient or require modification to assess the site conditions:

- o The wells currently at the site only penetrated a few feet below the water table. The thickness of the aquifer is important to model the hydrogeologic conditions and contaminant flow path.
- o Previous estimates of groundwater flow characteristics including volume and velocity are based on broad assumptions. Aquifer tests should be performed to better evaluate the groundwater flow.
- o The monitoring wells were completed within the top two feet of the aquifer. Since some contaminants segregate to the top or bottom of the aquifer, the

Mr. Jim Leiter
Solid and Hazardous
Wastes Bureau
September 6, 1989
Page 2

test results acquired to date may be skewed to show higher or lower constituent concentrations than may be present in the entire aquifer.

- o Only a few constituents have been tested for and more extensive laboratory testing may be required by the state.

In order to better evaluate the existing site hydrogeologic conditions and levels of contamination, we propose to perform additional work at the site prior to submitting a Final Plan for Groundwater Monitoring to the State. The additional work that we feel is appropriate at this time includes:

- o Contacting Forest Service and SCS officials who conducted the previous investigations for additional information regarding well logs, completion records of the monitoring wells and any other additional information available at these sources.
- o Contacting the DNRC to canvass the logs of existing water wells in the area for information including aquifer tests.
- o Drilling one new well southwest of the landfill to the bottom of the subject aquifer or 100 feet, whichever is less. During drilling of this well, water samples should be obtained at the top of the aquifer and at each 20 to 25 feet interval below the water table. A continuous log of material encountered should be recorded by a geologist on the site. This well should be completed as a groundwater monitoring well according to current Environmental Protection Agency guidelines. (If so desired, A pump may be installed within this well for production of non-potable water for use at the landfill site. This water will probably not be suitable for drinking and may contain sufficient iron concentrations to stain fixtures.)
- o Following completion of the new monitoring well and release of the driller, aquifer tests should be performed in the well to determine groundwater flow characteristics.

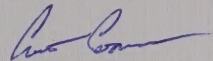
Mr. Jim Leiter
Solid and Hazardous
Wastes Bureau
September 6, 1989
Page 3

- o Chemical testing of the water obtained from the new monitoring well should be performed to determine the vertical distribution of contaminants. A more extensive list of constituents should be tested for than during previous monitoring and testing. More extensive testing is recommended to better evaluate the extent of contamination at the site and to provide a broad baseline for future monitoring of selected constituents.
- o The existing wells should be sampled and should be tested for the seven constituents already established during the previous monitoring program. This will provide data to compare with previously established baseline contaminant levels.

Following completion of this additional work and analysis of the information gathered, we will formulate and submit a Final Plan for Groundwater Monitoring for your review. We would appreciate any comments that you may have before we conduct the work identified herein.

Yours very truly,

Damschen and Associates



Curt Coover
Project Hydrogeologist

RECEIVED

SEP 11 1989

Montana Department of Health
and Environmental Sciences
Solid and Hazardous Waste Bureau

REPLY TO: 7460 Solid Waste

Date: 12/27/88

SUBJECT: Groundwater Monitoring Wells
West Yellowstone Solid Waste Disposal Site

TO: Ralph Meyer, District Ranger
Hebgen Lake Ranger District

Information on the nine monitoring wells near the existing transfer station site is summarized below.

The wells were installed August, 1977 by the Soil Conservation Service drill crew and myself. The wells were cased with schedule 40 polyvinyl chloride (PVC) pipe with glued coupling joints. The lower couple feet of the casing was perforated with small holes drilled through the casing or slots cut with a handsaw.

Holes were drilled with an auger drill and the casing slipped down the open hole. The material was sand all the way to the bottom of the hole and would slough in at the water line. In all wells, the PVC casing penetrated the groundwater a couple of feet due to the sloughing problem.

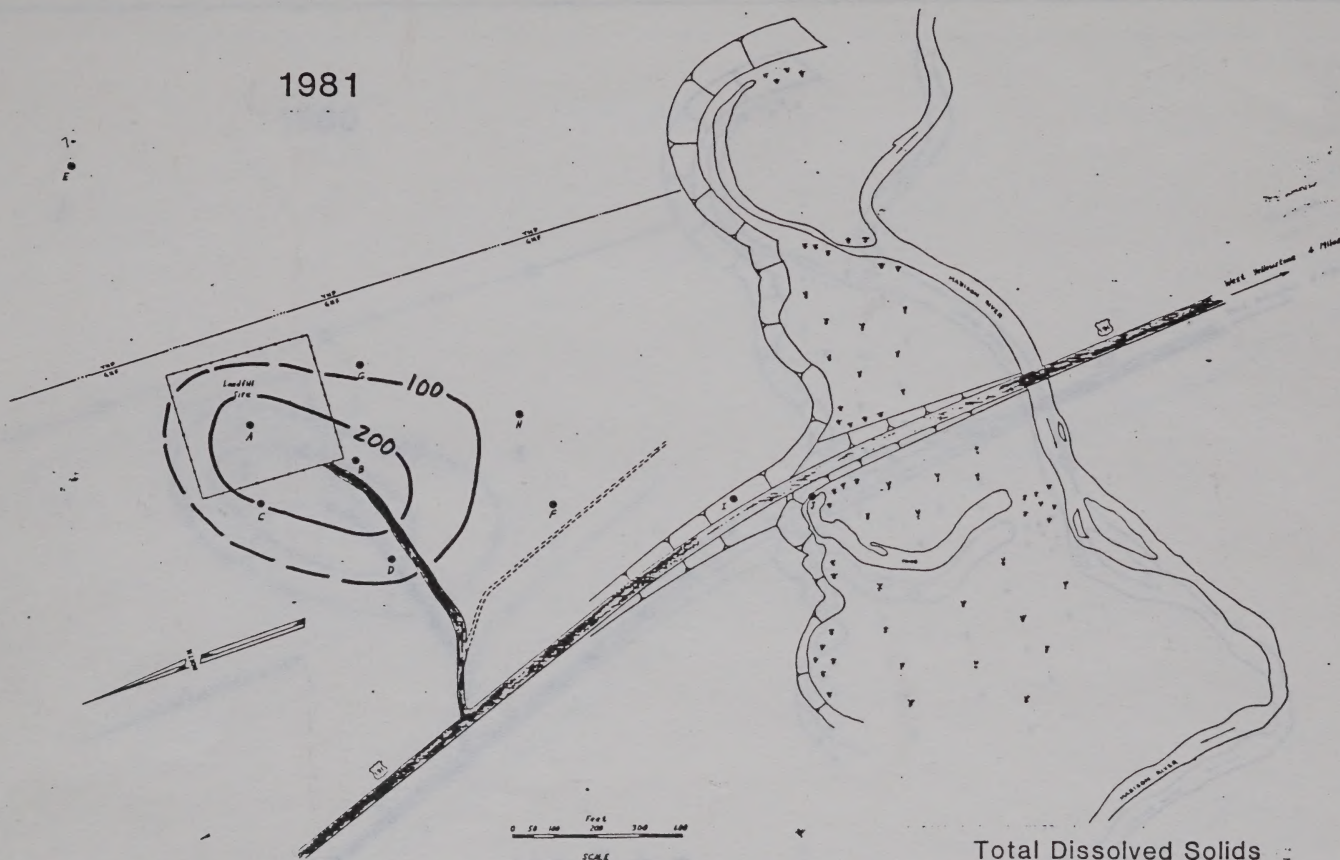
Visually, all of the materials removed from the drill holes looked the same and is commonly called, "obsidian sand". One soil classification test was made from a sample taken from one of the wells. The soil was described as coarse silty sand. The material testing report is attached.

Locations of the nine monitoring wells are shown on the attached site plan. Well depths are summarized below.

<u>Well ID</u>	<u>Depth to Groundwater (ft)</u>	<u>Overall Est. Depth (ft)</u>
A	47.6	49
B	51.1	53
C	47.9	50
D	52.1	54
E	41.9	44
F	60.4	62
G	51.6	53
H	55.5	57
I	45.6	47

The wells were bailed by hand and never adequately cleaned. It is recommended that the existing wells be cleaned by blowing with compressed air, etc. before proceeding with any further groundwater monitoring.

1981

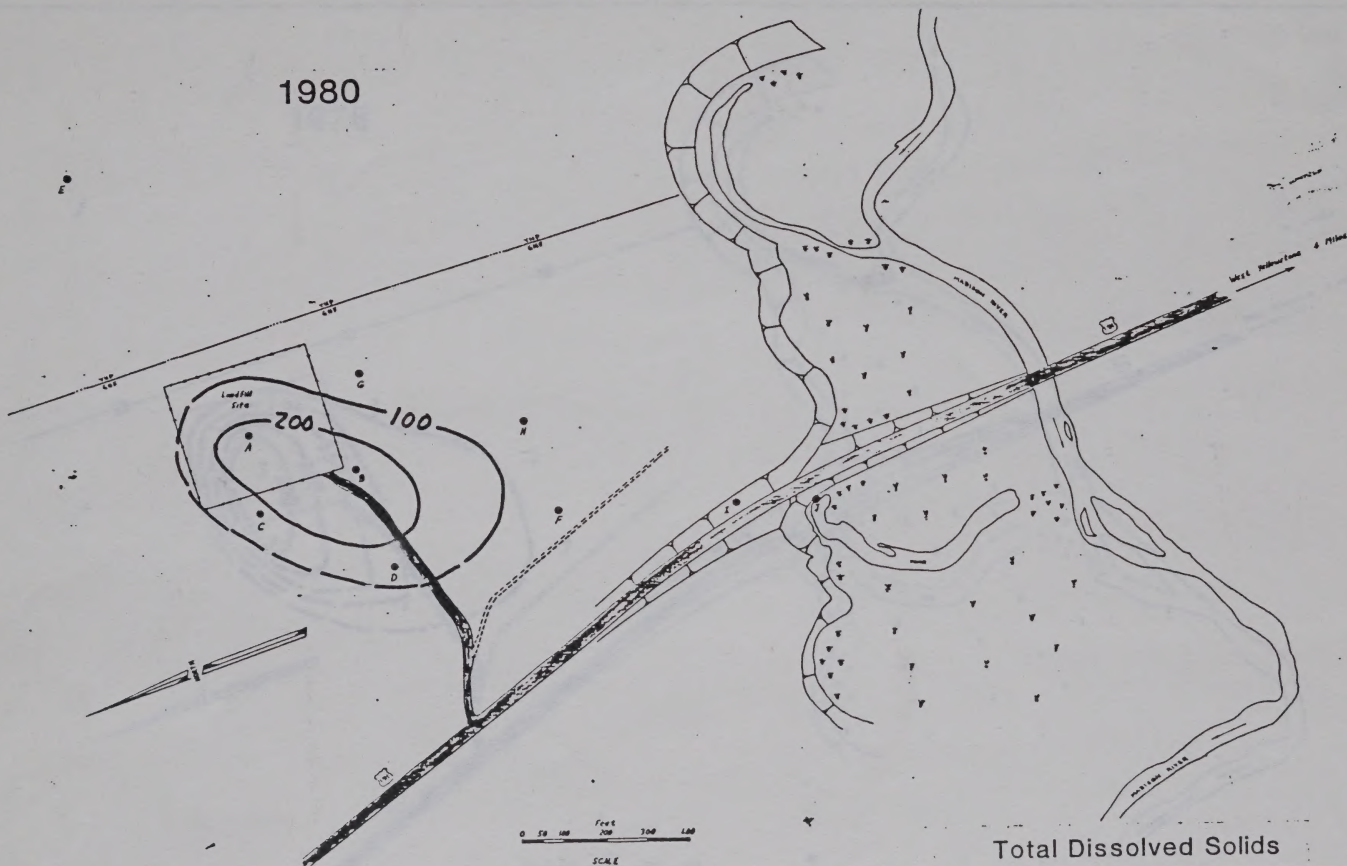


● Groundwater Monitoring Well, except 7 is a surface seep

Total Dissolved Solids

Submitted by H. Kringler	Project Engineer H. Kringler	GROUNDWATER TESTING HEBGEN BASIN SOLID WASTE DISPOSAL DIST.	U. S. DEPARTMENT OF AGRICULTURE FOREST SERVICE NORTHERN REGION	Sheet
Created by H. Kringler	Approved by H. Kringler			File No.
Project No.		Project No.		

1980

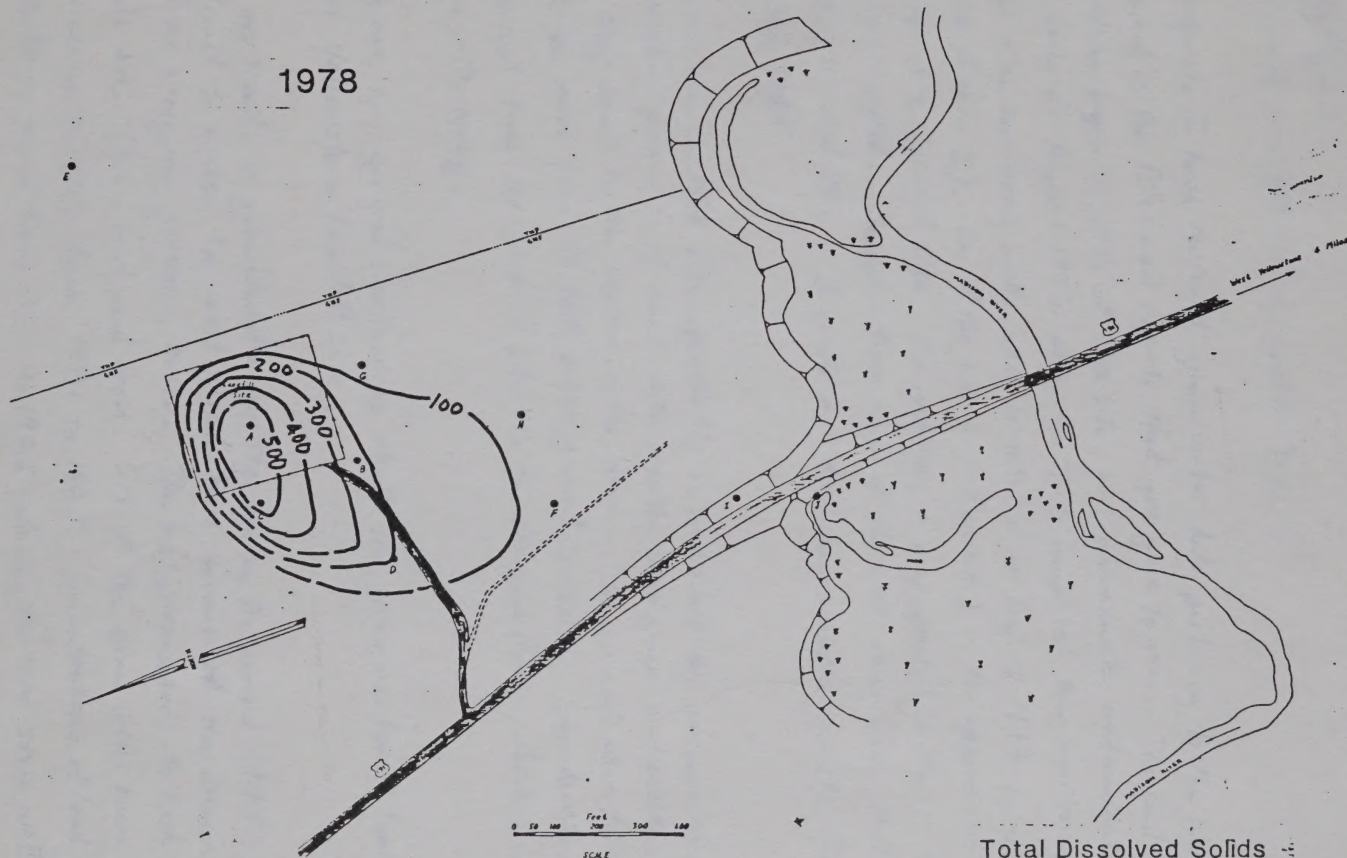


● Groundwater Monitoring Well, Except J is a Surface Sump

Total Dissolved Solids

Investigator H. Kringler	Project Name W. B. Ruckel	GROUNDWATER TESTING HEBGEN BASIN SOLID WASTE DISPOSAL DIST.	U. S. DEPARTMENT OF AGRICULTURE FOREST SERVICE NORTHERN REGION
Contract No. 6-55112	Project No. 1		Project No. 1

1978



Total Dissolved Solids

Designed by H. K. Fiedler	Project Supt. / Revised H. K. Fiedler	GROUNDWATER TESTING HEBGEN BASIN SOLID WASTE DISPOSAL DIST.	U. S. DEPARTMENT OF AGRICULTURE FOREST SERVICE NORTHERN REGION	Project No. 100
Checked by A. G. Rasmussen	Approved by A. G. Rasmussen			

Office Memorandum

STATE DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SCIENCES

page 1 of 2

TO : Jim Leiter
FROM : Doug Regness
SUBJECT : Review of West Yellowstone Landfill Data

DATE: 4-21-88

As per your request, I have reviewed groundwater data pertaining to the West Yellowstone landfill contained in the files and reports that you gave to me. The landfill operation at West Yellowstone began in 1971 at this site, and groundwater contamination was identified as early as August 1976 when the SCS completed two monitoring wells. An additional nine monitoring wells were completed in August 1977 by the USFS and SCS (wells A thru I). One of the nine wells (well E) is the upgradient or background well at the landfill site. In addition, a seep located southwest from the landfill has been sampled. Samples from some of the wells have been collected in 1977, 78, 80, 81, and 85. I could not find any sample results dated later than July 1985.

The West Yellowstone landfill site apparently is underlain by unconsolidated materials consisting primarily of sand, with possibly some gravel and cobbles. Little or no clay seems to be located in the area. The groundwater table is referenced to be more than 40 feet below ground surface. Groundwater flows southwest from the landfill site to the Madison River, which is located less than one mile away.

The following are my general conclusions about the groundwater situation at the West Yellowstone landfill site:

- (1) Changes or trends in groundwater quality during the period 1977-85 are difficult to assess for most parameters because ~~of~~ they weren't analyzed on a regular periodic basis. The best parameters to look at for trends are TDS, lead and iron. Six of the nine wells have shown a major increase in TDS from 1981 to 1985. Concentrations of lead generally show a declining trend from 1981 to 1985, whereas for iron some wells indicate a declining trend and some wells show a rising trend.

(continued)

Office Memorandum

STATE DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SCIENCES

TO :
FROM : (continued p. 2)
SUBJECT : West Yellowstone Landfill

DATE: 4-21-88

- (3) The major chemical parameters that show generally elevated concentrations downgradient of the landfill are TDS, CO_2 , Fe, Mn, COD, Pb, and Cd. These parameters indicate a leachate has developed from the landfill site and has formed a "plume" of contaminated groundwater migrating toward the Madison River. It is not known whether the plume has reached the Madison River, but the plume seems to be expanding (based primarily on TDS) as of 1985. ~~data~~ Parameters that have exceeded Federal drinking water standards include Fe, Mn, Pb and ~~As~~ Cd.
- (4) The only organics data available were some pesticide constituents analyzed in 1976 & 1977 samples. All results were below detection levels. It is possible that other common organic parameters may have leached into the groundwater, such as those associated ^{with} solvents, cleansers, paints, and fuels.
- (5) Sampling of monitoring wells should have continued at least annually since 1985. I would suggest analyzing for a more complete suite of parameters at least once (inorganics & organics) to better characterize the contaminants of concern in groundwater. It also may be beneficial to collect at least one sample from the Madison River downgradient of the landfill site to assess whether any contaminants may be reaching the river.
- (6) The geology of the landfill site consisting of unconsolidated sand, relatively shallow groundwater, and high precipitation is conducive to leachate development. Leachate probably will continue to occur from the landfill for many years unless an adequate cover or cap is emplaced over the site to prevent downward percolation of water.

DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES



TED SCHWINDEN, GOVERNOR

COGSWELL BUILDING

STATE OF MONTANA

HELENA, MONTANA 59620

Solid & Hazardous Waste Bureau
(406)444-2821

January 15, 1987

Larry Wanner, Chairman
West Yellowstone - Hebgen Basin Solid Waste District
c/o Gallatin County Commissioners
Courthouse
Bozeman, Montana 59715

Dear Larry,

First off, let me apologize for the length of time it has taken to prepare this response to our December 10, 1986, meeting. Even though I drafted a response soon after the meeting, it has taken me a while to finalize my comments.

As we discussed at the Refuse Board meeting, the burial of metal wastes could aggravate the existing groundwater contamination problem. These wastes do degrade and provide contaminants which could add significantly to the leachate plume. The method of burial will greatly influence the rate at which that inevitable degradation will occur, and how much influence it will have on groundwater quality when it does.

Just to keep this response as brief as possible, I have listed the apparent alternatives for disposal of the existing metal pile and new accumulations. These alternatives are listed in the order of least to worst impact on groundwater quality at the site:

1) Haul all wastes away from the transfer facility. Dispose of no wastes on-site.

2) Dispose of only inert wastes on-site. Raise the elevation of the landfill a bit to cause drainage to run away from the waste currently buried on-site. Cap the landfill with the tightest soil available.

3) Dispose of only inert wastes on-site in trenches. Bury old appliances, etc. on top of the completed trenches, cover and grade the final cover to divert drainage away from the waste.

4) Place inert wastes and metal waste into the trenches.

5) Continue landfilling as is currently being practiced. The lack of supervision of materials dumped into the trenches has allowed much "group II" waste to be mixed with the metal in the trench.

In my opinion, neither of the last two possibilities are desirable, since they will only continue to make the current contamination plume worse. I have the following recommendations for continued, best use of the area:

1) Investigate the cost of installing large containers to haul away most, if not all, of the waste from the site.

2) If costs seem reasonable, develop a plan for a ramp and maintenance considerations for handling the containers and the waste. The plan will also need to address the problem of contractor disposal.

3) If costs of hauling away the majority of the material do not seem reasonable, see if the Forest Service will consider a plan to raise the final elevations of the fill. If so, propose to use inert materials to raise the elevation, and haul away all white goods and other metal waste.

4) In the event the costs of hauling away any waste is excessive, bury the inert wastes in trenches and dispose of metal waste above grade, insuring that drainage flows away from all buried waste materials. Restrict acceptance of wastes which cannot be practically handled at the facility. Have the Soil Conservation Service or other qualified consultants make recommendations on drainage, maximum elevations and adding liners or soil amendments to maximize drainage away from any buried waste materials.

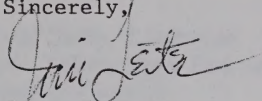
We also discussed burning at the landfill to conserve space. Under current air quality rules, open burning of untreated wood wastes may be acceptable during certain seasons, under certain conditions, and after a permit is obtained from the Air Quality Bureau. In the case of the West Yellowstone facility, I am reluctant to recommend that wood wastes be burned, since wood ash contaminants can be very mobile in sandy soils. If wood waste burning is considered, then I would recommend stockpiling the ash for burial elsewhere. If wood wastes were buried on-site, however, I can see very little chance that they would create a problem.

I have enclosed a copy of John Geach's letter on May 10, 1985, regarding burial of the existing metal pile. As we discussed, I agree with John that on a one time basis the material can be buried in a separate area without much impact. It would be far preferable, however, to bury the material in accordance with this letter, above the natural grade of the existing land.

DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES

Thank you for the invitation to the Board meeting. If you have any further questions or if I can be of other service, please contact me.

Sincerely,


James E. Leiter
Solid & Hazardous Waste Bureau

cc: Emery Nelson, R.S.
Board of County Commissioners, Gallatin County

Ralph Meyer
U.S. Forest Service
West Yellowstone, Montana 59758

DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES



TED SCHWINDEN, GOVERNOR

COGSWELL BUILDING

STATE OF MONTANA

May 10, 1985

HELENA, MONTANA 59620

Clyde Seely, Chairman
West Yellowstone Refuse
Disposal District
P.O. Box 239
West Yellowstone, MT 59758

Dear Mr. Seely,

Emery Nelson recently contacted our office inquiring about the district's proposal of burying the scrap metal accumulation at the West Yellowstone class III landfill. On April 24 Duane Robertson, Emery Nelson and I visited the landfill site to evaluate this proposal. An extremely large accumulation of scrap metal, wood and concrete was noted at the site. Although these materials are mixed together it appears the major component is metal.

As you are aware the U.S. Forest Service and our department are very concerned about the leachate generation and migration problems identified several years ago at this landfill site. The continuance of landfilling at this site is dependent on the severity of this leachate threat to the environment. If this threat becomes more severe, landfilling must be discontinued and leachate remedial action initiated.

Leachate is a complex substance resulting from the decomposition of refuse. A high concentration of dissolved metals is normally found in municipal landfill leachate. Metals when mixed with buried refuse are reacted upon directly by the leachate generated by the decomposition of putrescible refuse. Leachate due to its generally acidic nature dissolves metals more rapidly than would naturally occur. If scrap metals are buried separately from decomposable wastes in unsaturated soils; the break down and release of the metals would normally be very slow.

The hydrogeological data for the West Yellowstone landfill indicates the natural PH of the groundwater and soil falls in a neutral range which would not accelerate metal decomposition. The soils also appear to be well drained which would prevent high amounts of moisture from being confined around these buried materials.

Given this rationale it is the feeling of this department that the current scrap metal and demolition material accumulation can be buried at the West Yellowstone landfill without seriously altering either the composition of the sites leachates or the quality of the down gradient groundwater.

In the future, metals and group III materials should be disposed of in the following manner:

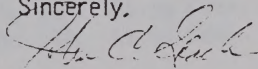
1. Light-non bulky metals should be disposed of by compacting with other group II materials in the transfer station's compactor truck.

2. Heavy or bulky metals and inert materials such as concrete could be buried in trenches excavated in portions of the landfill that do not contain previously buried refuse or saturated soil conditions. These materials must be periodically compacted and covered to conserve space, eliminate eyesores and to attenuate infiltration of precipitation.
3. Light wood wastes, shrub prunings and grass clippings will compact easily and should be placed directly in the transfer station and compactor truck.
4. Large bulky untreated wood or tree wastes can be stockpiled and periodically burned with a state issued burning permit. Items such as shingles, insulation and linoleum are prohibited by the states air quality rules and must be separated from any wood demolition materials prior to stockpiling.

Enclosed are copies of the state Air Quality Act and open burning rules which cover the burning permit process in greater detail. I've also enclosed several burning permit application forms for your future use. You'll note prior to burning, the wood pile must be inspected by the county sanitarian's office and a completed permit application must be sent to the state Air Quality Bureau here in Helena.

If you have any questions or if we may be of further assistance to your solid waste program please let us know.

Sincerely,



John C. Geach
Solid & Hazardous Waste Bureau
Telephone (406) 444-2821

Encl.

cc: Emery Nelson, County Sanitarian, Courthouse, RM 3, Basement, Bozeman
Ralph Meyer, U.S. Forest Service, West Yellowstone

JG/ba

SUMMARY OF PRECIPITATION DATA (Inches)

Hebgen Dam & West Yellowstone Recording Sites

(Figure in Parenthesis is % of 30-year Average)

Hebgen Dam

<u>Preceding</u>	<u>1978</u>	<u>1980</u>	<u>1981</u>	<u>1985</u>	<u>30-Year Average</u>
3 Months	6.16 (80)	11.84 (154)	8.89 (115)	7.13 (93)	7.70
6 Months	15.73 (107)	15.87 (108)	14.11 (96)	12.93 (88)	14.67
9 Months	28.01 (117)	21.76 (91)	20.25 (85)	18.78 (79)	23.84
12 Months	34.43 (117)	28.57 (97)	26.21 (89)	25.66 (87)	29.37

West Yellowstone

<u>Preceding</u>	<u>1978</u>	<u>1980</u>	<u>1981</u>	<u>1985</u>	<u>30-Year Average</u>
3 Months	5.06 (82)	8.39 (136)	6.98 (113)	6.75 (109)	6.17
6 Months	9.00 (81)	12.31 (111)	10.14 (91)	12.22 (110)	11.09
9 Months	16.16 (91)	16.00 (90)	13.38 (75)	15.79 (89)	17.75
12 Months	21.90 (98)	19.61 (88)	18.41 (82)	20.96 (94)	22.34

Average of Hebgen Dam & West Yellowstone

<u>Preceding</u>	<u>1978</u>	<u>1980</u>	<u>1981</u>	<u>1985</u>	<u>30-Year Average</u>
3 Months	5.61 (81)	10.11 (146)	7.94 (114)	6.94 (100)	6.94
6 Months	12.37 (96)	14.09 (109)	12.13 (94)	12.58 (98)	12.88
9 Months	22.09 (104)	18.88 (87)	16.81 (79)	17.27 (81)	21.30
12 Months	28.17 (109)	24.09 (93)	22.31 (86)	23.31 (90)	25.86

SUMMARY OF DISSOLVED IRON DATA
WEST YELLOWSTONE LANDFILL GROUNDWATER STUDY - 1985

(Results In Milligrams Per Liter - mg/l)

<u>Well</u>	*	1978			<u>August 1</u>	*	1981	*	1985	*
		<u>Min.</u>	<u>Max.</u>	<u>Average</u>			<u>July 20</u>		<u>July 30</u>	
A	*	35.4	91.6	61.9	91.6	*	33.9	*	24	*
B	*	10.0	33.0	17.5	12.4	*	27.7	*	22	*
C	*	LT0.01	19.1	4.0	0.04	*	12.2	*	32	*
D	*	0.02	8.8	2.6	0.8	*	22.1	*	1.5	*
E	*	LT0.01	0.03	0.02	0.03	*	N.D.	*	N.D.	*
F	*	LT0.01	0.06	0.03	0.03	*	N.D.	*	6.0	*
G	*	LT0.01	0.03	0.02	0.01	*	0.24	*	N.D.	*
H	*	N.D.	0.07	0.03	0.03	*	N.D.	*	N.D.	*
I	*	LT0.01	0.04	0.02	0.03	*	N.D.	*	N.D.	*

N.D. = None Detected, Detection Limit = 0.01 mg/l

Summary of Hinkley Test Data
West Hinkley Landfill Groundwater Study - 1982
(Concentrations in Milligrams Per Liter - mg/L)

Well	* 1979	Max.	Average	* 1981 August 1 - July 31	* 1982 July 31 - July 31
1	120.01	0.01	0.01	0.01	0.01
2	4.0	0.01	0.01	0.01	0.01
3	120.01	0.01	0.01	0.01	0.01
4	120.01	0.01	0.01	0.01	0.01
5	120.01	0.01	0.01	0.01	0.01
6	120.01	0.01	0.01	0.01	0.01
7	120.01	0.01	0.01	0.01	0.01
8	120.01	0.01	0.01	0.01	0.01
9	120.01	0.01	0.01	0.01	0.01
10	120.01	0.01	0.01	0.01	0.01
11	120.01	0.01	0.01	0.01	0.01
12	120.01	0.01	0.01	0.01	0.01
13	120.01	0.01	0.01	0.01	0.01
14	120.01	0.01	0.01	0.01	0.01
15	120.01	0.01	0.01	0.01	0.01
16	120.01	0.01	0.01	0.01	0.01
17	120.01	0.01	0.01	0.01	0.01
18	120.01	0.01	0.01	0.01	0.01
19	120.01	0.01	0.01	0.01	0.01
20	120.01	0.01	0.01	0.01	0.01
21	120.01	0.01	0.01	0.01	0.01
22	120.01	0.01	0.01	0.01	0.01
23	120.01	0.01	0.01	0.01	0.01
24	120.01	0.01	0.01	0.01	0.01
25	120.01	0.01	0.01	0.01	0.01
26	120.01	0.01	0.01	0.01	0.01
27	120.01	0.01	0.01	0.01	0.01
28	120.01	0.01	0.01	0.01	0.01
29	120.01	0.01	0.01	0.01	0.01
30	120.01	0.01	0.01	0.01	0.01

N.D. = None Detected, Detection Limit = 0.01 mg/L

SUMMARY OF DISSOLVED LEAD DATA
WEST YELLOWSTONE LANDFILL GROUNDWATER STUDY - 1985

(Results In Milligrams Per Liter - mg/l)

Well	*	1978			August 1	*	1981	*	1985	*
		Min.	Max.	Average			July 20		July 30	
A	*	0.006	0.010	0.080	LT0.005	*	0.012	*	0.004	*
B	*	(One sample 7-11-78)			0.015	*	0.007	*	0.002	*
C	*	(Two samples) 0.007 & 0.015				*	0.008	*	0.003	*
D	*	(No samples)				*	0.016	*	0.004	*
E	*	(One sample 7-11-78)			0.005	*	0.012	*	0.002	*
F	*	(No samples)				*	0.042	*	N.D.	*
G	*	(One sample 11-8-78)			0.006	*	0.010	*	N.D.	*
H	*	(No samples)				*	0.028	*	0.002	*
I	*	(One sample 11-8-78)			0.005	*	0.032	*	N.D.	*

LT = Less Than

N.D. = None Detected, detection limit = 0.001 mg/l

SUMMARY OF DISSOLVED ZINC DATA
WEST YELLOWSTONE LANDFILL GROUNDWATER STUDY - 1985

(Results In Milligrams Per Liter - mg/l)

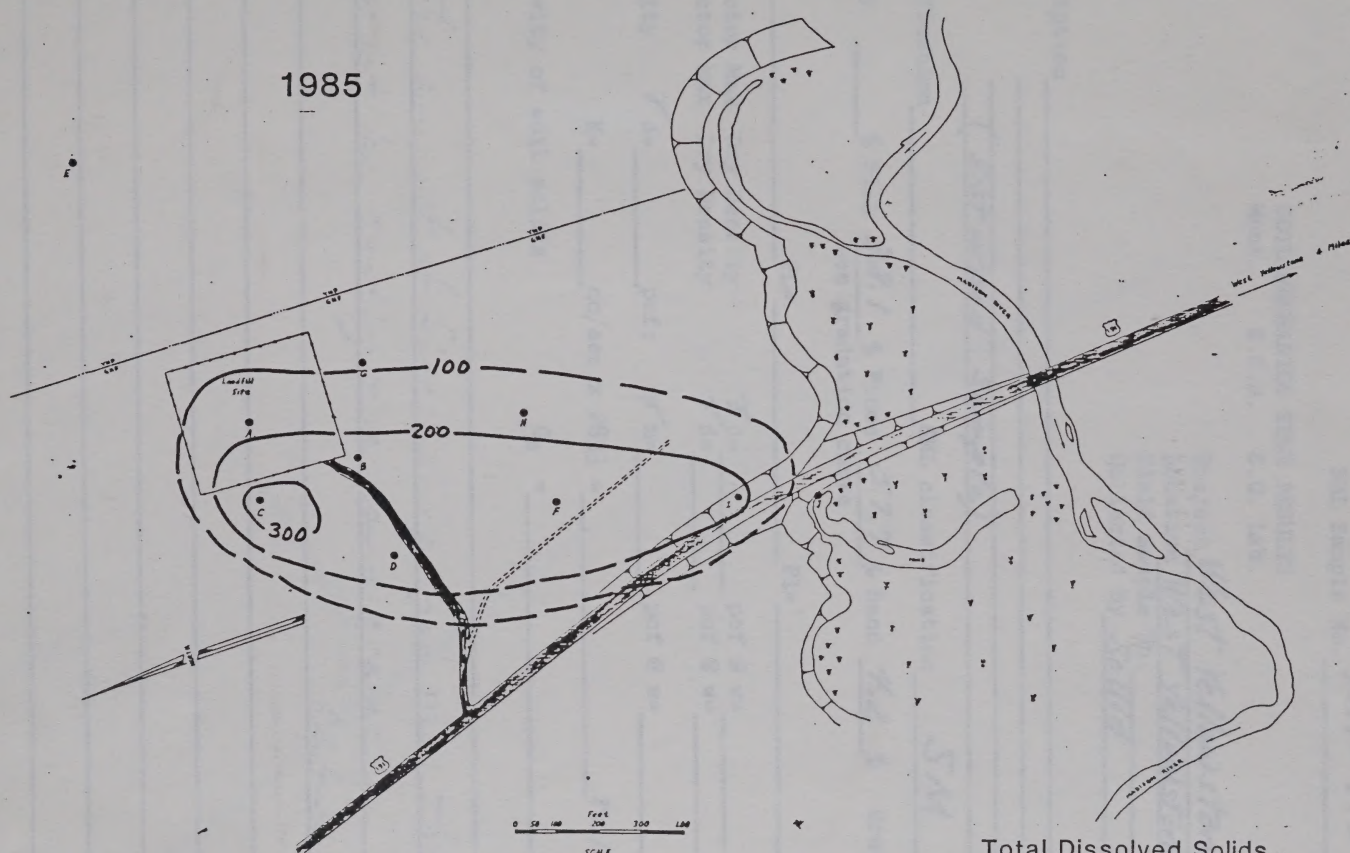
Well	*	1978				*	1985	*
		Min.	Max.	Average	August 1		July 30	
A	*	0.02	0.17	0.09	0.07	*	8.9	*
B	*	0.08	0.11	0.08	0.10	*	0.02	*
C	*	0.05	0.13	0.09	0.07	*	0.02	*
D	*	0.02	0.31	0.09	0.06	*	0.04	*
E	*	0.02	0.06	0.03	0.05	*	0.01	*
F	*	0.01	0.64	0.12	0.11	*	N.D.	*
G	*	0.01	0.03	0.02	0.01	*	N.D.	*
H	*	0.03	0.10	0.06	0.04	*	N.D.	*
I	*	0.02	0.15	0.06	0.06	*	0.03	*

SUMMARY OF TOTAL DISSOLVED SOLIDS DATA
WEST YELLOWSTONE LANDFILL GROUNDWATER STUDY - 1985

(Results In Milligrams Per Liter - mg/l)

Well	*	1978				*	1980		*	1981		*	1985		*
		<u>Min.</u>	<u>Max.</u>	<u>Average</u>	<u>Aug. 1</u>		<u>June 25</u>	<u>July 20</u>		<u>July 20</u>	<u>July 30</u>		<u>July 30</u>	<u>July 30</u>	
A	*	332	562	488	562	*	277	*	290	*	180	*			*
B	*	193	484	310	201	*	225	*	230	*	235	*			*
C	*	254	530	357	530	*	192	*	200	*	343	*			*
D	*	169	349	236	201	*	188	*	190	*	240	*			*
E	*	50	97	78	64	*	67	*	70	*	75	*			*
F	*	82	117	105	82	*	52	*	20	*	270	*			*
G	*	79	105	87	80	*	58	*	40	*	110	*			*
H	*	74	170	95	76	*	59	*	50	*	170	*			*
I	*	86	106	96	90	*	70	*	40	*	210	*			*

1985



● Conductor Monitoring Well, Except J is a Surface Seep

Total Dissolved Solids

Designed by	Forest Exp. Station	GROUNDWATER TESTING HEBGEN BASIN SOLID WASTE DISPOSAL DIST.	U. S. DEPARTMENT OF AGRICULTURE FOREST SERVICE NORTHERN REGION	Project No.
Drawn by	H. E. Thomas			
Checked by	A. G. Thomas, Assistant & Chief			
E. S. Craig, Inc.		Project No.		

MT-ENG-211
12/5/67

SML Sample No.

MT-719

SOIL MECHANICS TEST RESULTS

Mont. S.C.S. S.O. Lab.

Project West Yellowstone Landfill
Location West Yellowstone, MT
Field Sample No. _____
Collected by Sollid

Sample description _____

(Disturbed Sample)

Field classification _____

SML classification _____

SM

% Clay _____ % Silt 38.1 % Fines 57.7 % Sand 4.2 % Gravel _____
see gradation curve

LL= _____

PL= _____

PI= _____

Standard Proctor Max Dry Density

γ_d = _____ pcf @ w = _____ %

Modified Proctor Max Dry Density

γ_d = _____ pcf @ w = _____ %

Implace Density

γ_d = _____ pcf: γ_m = _____ pcf @ w = _____ %

Permeability

K = _____ cc/sec x 2833 = _____ Ft./day

Specific Gravity of soil solids

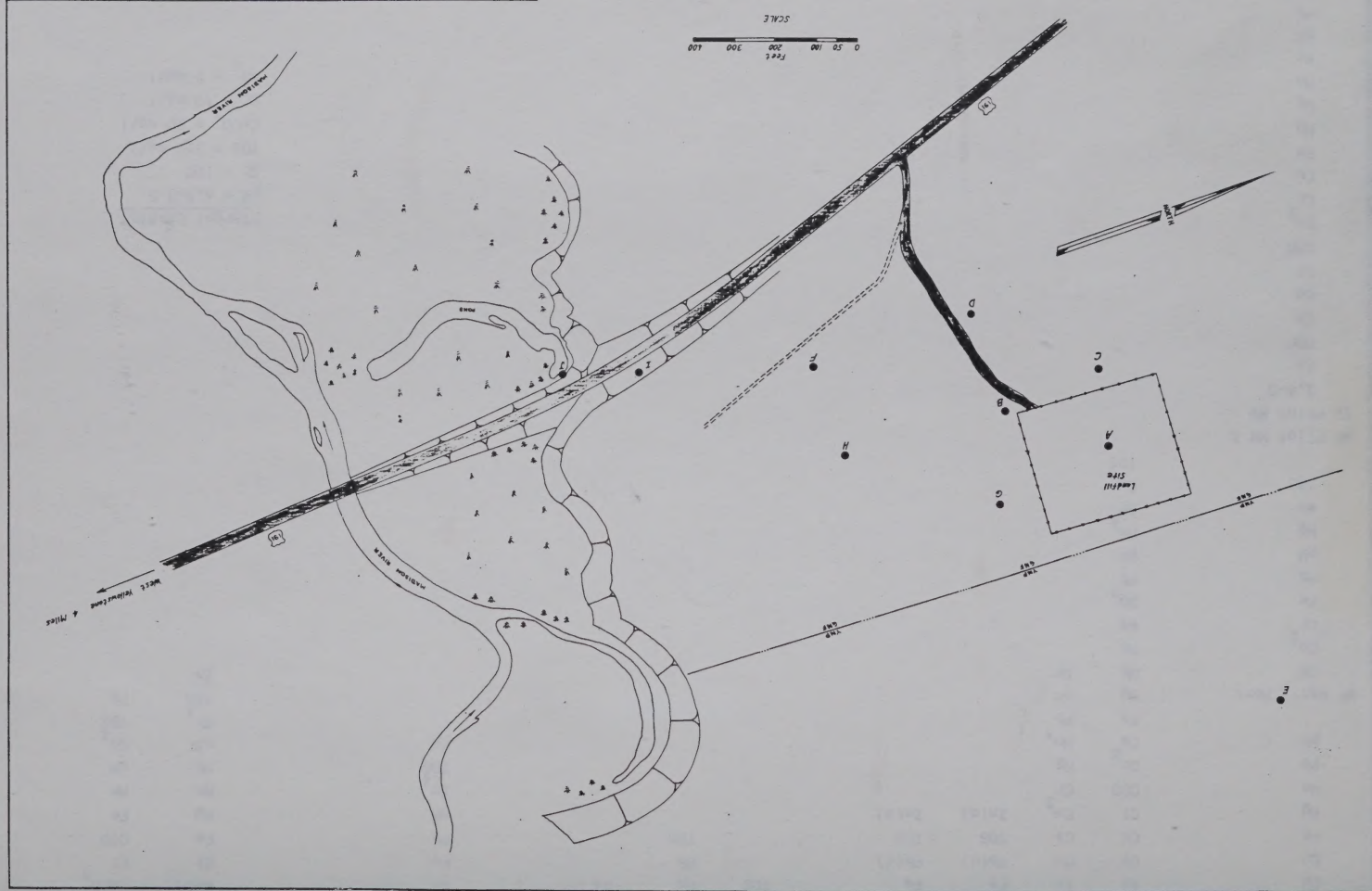
G_s = _____

Remarks

The amount of fines suggested me. They
must be coating the sand grains.

Hydric

U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE NORTHWEST REGION		Project No. _____ Date _____	
Drawn by R. O. Thompson		Checked by R. O. Thompson	
Project Title R. O. Thompson		Project Title R. O. Thompson	



● Groundwater Monitoring Well, Except 3 is A
 Surface Scarp

SCALE

0 50 100 200 300 400
 Feet

9 Monitoring
Wells Installed

WEST YELLOWSTONE -- CLASS II LANDFILL

SAMPLING SCHEDULE

8/30/76

WY R.S. Well	9/8/77	9/9/77	8/1/78	10/4/78	1979	6/25/80	7/20/81	1982	1983	1984	1985	1986	1987	1988	10/4/89	10/24/90	1991	9/26/92	1993
Cd	As	As	Fe	Fe		TDS	Fe	Fe			Cl				CaCO ₃	CaCO ₃		CaCO ₃	
Cr	Ca	Cd	Pb(d)	Pb(d)			Pb				Fe				Cl	Cl		Cl	
Fe	Cd	Cl	TDS	TDS			TDS				Pb				Fe	COD		COD	
Hg	Cl	Co ₂	Zn(d)	Zn(d)							pH				Hg	Fe		Fe(d)	
Mn	COD	Cr ₂									So ₄				Mn	Mn		Mn(d)	
Pb	Co ₂	Hg									TDS				Pb	pH		So ₄	
pH	Cu	No ₃									Zn				pH	So ₄		TDS	
	Fe	Pb ₃													So ₄	TDS		Zn	
WY Nat'l Park	Hg	pH													TDS	Zn			
Cd	Mg	Sc													Zn				
Co ₂	Mn																		
Cr ₂	Na																		
Fe	No ₃																		
Pb	Pb ₃																		
pH	pH																		
Hg	Po ₄																		
Mn	Sc																		
TDS	So ₄																		
	TDS																		

NW Pilot MW 8

SW Pilot MW

2,4-D

As

BOD

Ca

Cd

Cl

COD

Co₂

Cr₂

Cu

Fe

Hg

Mg

Mn

Na

pH

Pb

Po₄

So₄

TDS

"Target Levels"

pH = 6.5-8.5

Sc = 100

TDS = 150 mg/l

CaCO₃ = 50 mg/l

CL = ₃ 10 mg/l

So₄ = 5 mg/l

